



## Lower Capilano Transportation Study March 2013

In February, 2013, Creative Transportation Solutions completed a Transportation Study for the Lower Capilano Marine Village Centre. The study assessed transportation impacts of envisioned land use changes. Based on the outcome of the study, the District is confident that there is a sound transportation plan for the area that will work well in the coming years.

Traffic from all of the existing land uses was measured. The study found that most traffic (about 95%) is passing through the area. The study acknowledges that congestion around the Lions Gate Bridge is not likely to improve. The study recommendations focus on getting people in and through the area most effectively, with alternatives to the intersection at Capilano Road and Marine Drive.

- With the worst case scenario of development-generated traffic in the peak hour in the year 2030, the study predicts that there would be a maximum of **about 10 new vehicle trips per minute travelling in the area**. About half of all new trips would use the new intersection at Curling Road/Curling Road extension. Less than 20 percent of the new trips (1 or 2 vehicles per minute) will use each of the intersections of Fullerton Avenue and Capilano Road and crossroads of McGuire Avenue and Capilano Road.
- As a **safety and capacity improvement**, a new dedicated left turn lane is proposed from Capilano Road southbound to Marine Drive eastbound.
- Already, about 20 percent of trips to/from the area are by **transit**. Marine Drive is part of the regional Frequent Transit Network and Capilano Road is envisioned to be part of the Frequent Transit Network in the future. This area will continue to have some of the best transit access in the region, with direct access to most of the region's jobs within less than 30 minutes. As the area develops, it is anticipated that people will select this area because of its excellent of transit accessibility.
- Currently, very few trips in the area are made by **walking** and this can be attributed to challenges of crossing Capilano Road. To make things better for pedestrians moving through the area to access retail services, recreation opportunities, and transit service, new intersections along Capilano Road and at Marine Drive and McGuire Avenue offer a more comfortable crossing experience.
- Bike lanes are planned along Capilano Road and **cycling** will be integral in the design of all streets in the area.
- **Parking** levels would be matched with demand and provided underground.
- Each development will be responsible for establishing a **construction management plan** to minimize the impacts of development on traffic in the area.

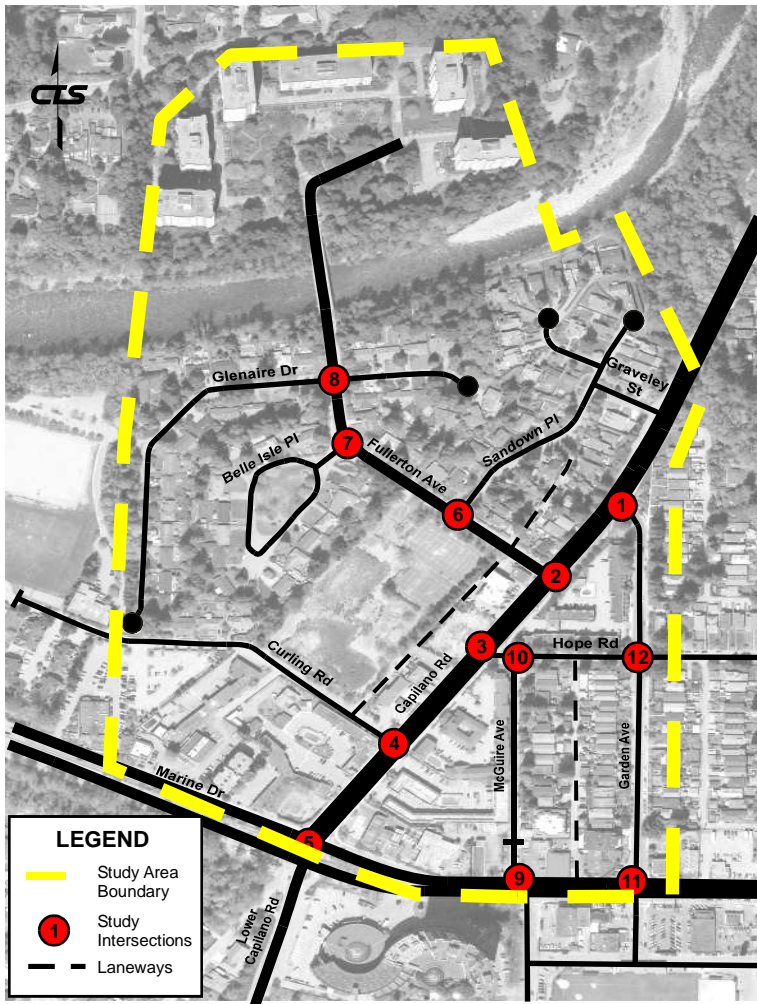
A full copy of the recommendations of the study follows.

# Lower Capilano Marine Village Centre Transport Plan

## Volume 2 - Summary Report

Prepared for

District of North Vancouver



Prepared by



FEBRUARY 2013

84a moody street  
port moody, bc  
canada v3h 2p5

604.936.6190

604.936.6175

www.cts-bc.com

---

# Lower Capilano Marine Village Centre Transport Plan Volume 2 – Summary Report



*Prepared for:*

**District of North Vancouver**  
355 West Queens Road  
North Vancouver, BC  
V7N 4N5  
(604) 990-2311

*Prepared by:*

**CREATIVE TRANSPORTATION SOLUTIONS LTD.**  
84A Moody Street  
Port Moody, BC  
V3H 2P5  
(604) 936-6190

**25 February 2013**

*File no: 3986-01*

---

# TABLE OF CONTENTS

<b>1</b>	<b>INTRODUCTION .....</b>	<b>1</b>
1.1	Background.....	1
1.2	Study Area .....	2
<b>2</b>	<b>EXISTING TRAFFIC VOLUMES .....</b>	<b>4</b>
2.1	Motorized Vehicles.....	4
2.2	Pedestrians .....	4
2.3	Bicycles.....	7
2.4	Public Transit .....	7
2.5	Transport Mode.....	11
<b>3</b>	<b>FUTURE BASE TRAFFIC VOLUMES .....</b>	<b>13</b>
3.1	Future Year 2030 Base Traffic Volumes .....	13
<b>4</b>	<b>REDEVELOPMENT OF LOWER CAPILANO.....</b>	<b>15</b>
4.1	Year 2012 Land Use .....	15
4.2	Year 2030 Future Land Use.....	16
4.3	Net Change in Key Land Uses from Redevelopment.....	17
4.4	Traffic Generation .....	17
4.5	Traffic Volume Forecast by Traffic Zone .....	19
4.6	Net Change in Traffic Volume Forecast by Traffic Zone .....	20
<b>5</b>	<b>TRANSPORT PLAN OPTIONS.....</b>	<b>22</b>
5.1	The Challenge.....	22
5.1	Do Nothing .....	23
5.2	Option 1 – Crossroads .....	27
5.3	Option 2 – Signalize Intersection of Capilano Rd & Curling Rd.....	31
5.4	Option 3 – Curling Road Extension to Garden Avenue .....	35
5.5	Option 4 – Curling/McGuire Connector .....	39
<b>6</b>	<b>TRAFFIC ANALYSIS.....</b>	<b>43</b>
6.1	Intersection Capacity Analysis .....	43
6.2	Review of Intersection Performance .....	46
6.3	Impact of New Signals in Study Area.....	47
6.4	Recommended Transport Plan .....	48

<b>7</b>	<b>CONCLUSIONS &amp; RECOMMENDATIONS .....</b>	<b>50</b>
7.1	Conclusions .....	50
7.2	Recommendations .....	55

SECTION  
1

## INTRODUCTION

### 1.1 Background

The District of North Vancouver is proposing to redevelop the Lower Capilano area in accordance with the recently approved Official Community Plan (OCP). Creative Transportation Solutions Ltd. (CTS) was retained by the District of North Vancouver in April 2012 to assist municipal staff in the development of a transport plan for the year 2030 that would support the proposed Lower Capilano Marine Village Centre. The primary objectives of this project were as follows:

1. To develop a 2030 transport plan that would address existing transportation deficiencies in the community;
2. To develop a 2030 transport plan for the year 2030 that would incorporate the future needs of the community;
3. To develop a 2030 transport plan that would technically support the proposed land use changes envisioned by the OCP;
4. To develop a 2030 transport plan that would be focused on moving people and not cars; and
5. To develop a 2030 transport plan that would encourage the use of alternative modes of transport such as transit, cycling and walking by enhancing existing facilities and building new ones.

The project was subdivided into three (3) key phases and they are as follows:

- Phase 1 – Assess existing conditions to determine baseline conditions;
- Phase 2 – Assess future travel demand and develop transport options to address demand; and
- Phase 3 – Develop a draft 2030 transport plan and prepare a draft report.

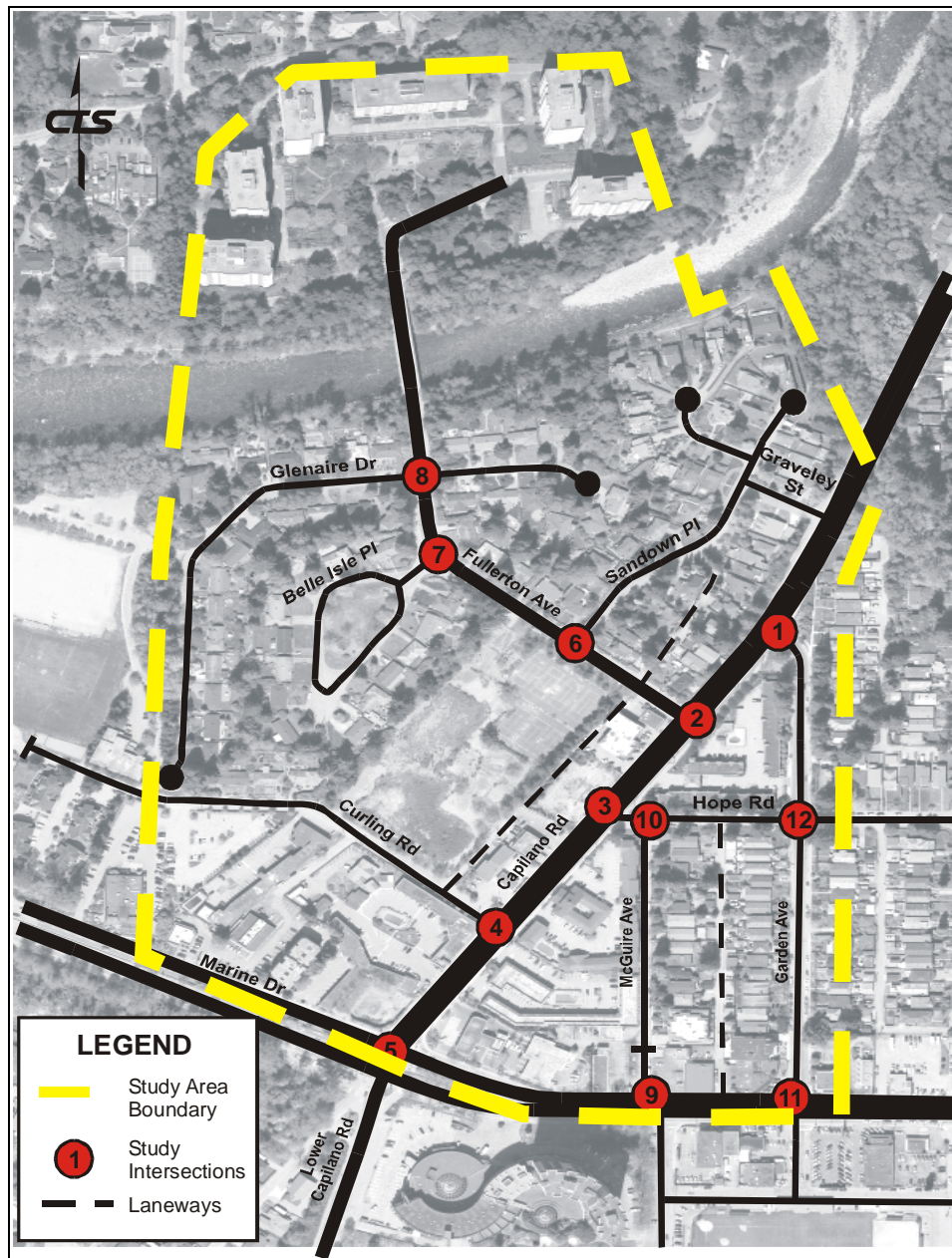
Of note, subsequent phases such as public and stakeholder consultation, refining the draft transport plan and issuing a final report are not part of the current work program.



## 1.2 Study Area

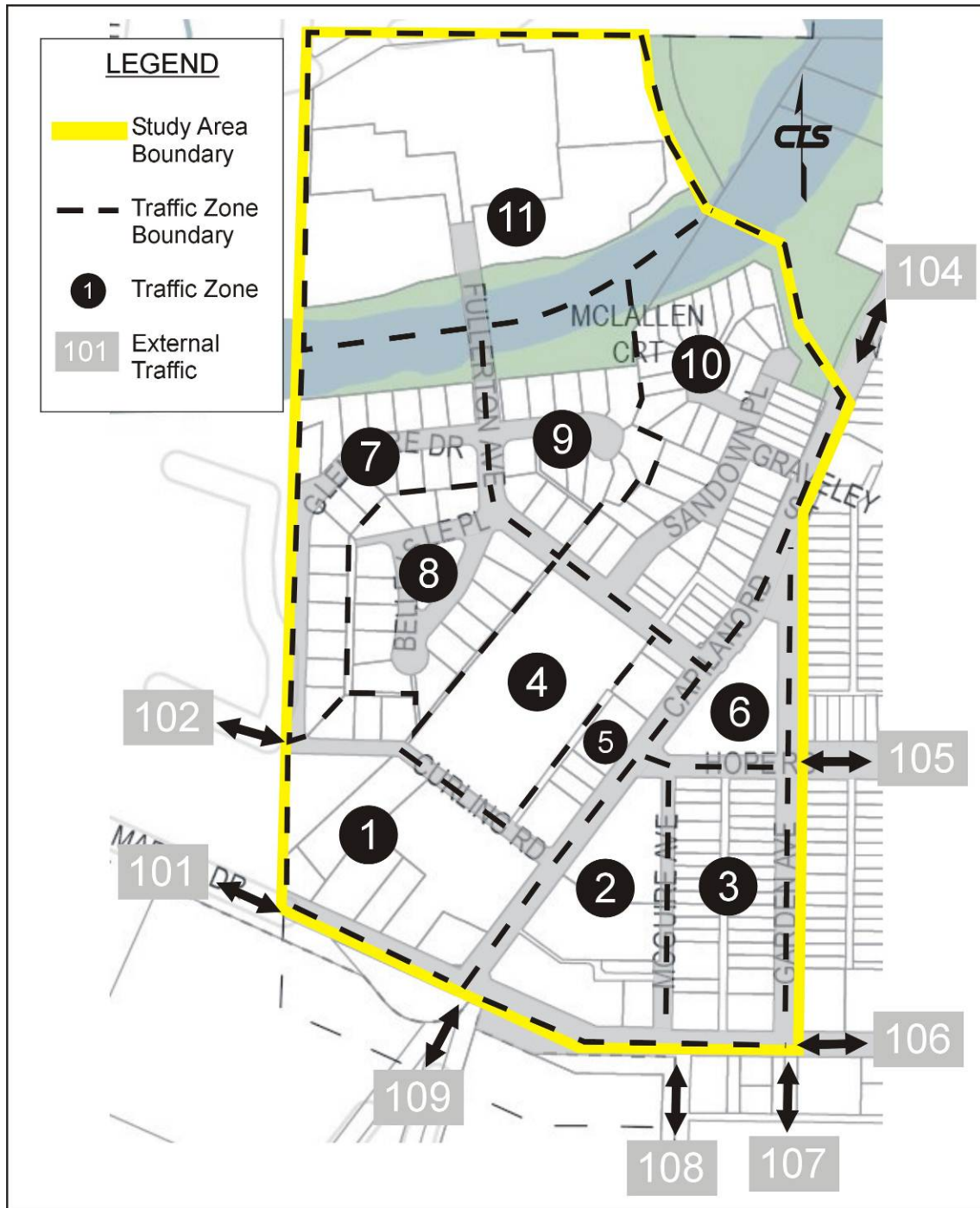
**FIGURE 1.1** illustrates the study area, which is bounded by the Capilano River to the north, Garven Avenue to the east, Marine Drive to the south and the municipal border to the west.

**FIGURE 1.1 - STUDY AREA**



The study area was then subsequently divided into eleven (11) traffic zones in order to permit a more detailed examination and this is illustrated in **FIGURE 1.2**.

**FIGURE 1.2 - TRAFFIC ZONE MAP**





SECTION  
2

## EXISTING TRAFFIC VOLUMES

The 2012 existing base traffic volumes of the study area were compiled using both adjusted historical data from the District of North Vancouver and recently collected traffic volumes from CTS. The design hour chosen for the study was the weekday afternoon peak hour which combines local work trips heading home, local shopping trips, residents returning to the Lower Capilano after working out of town, and the beginning of recreational weekend traffic along the Capilano Road and Marine Drive. It also coincides with the time period when counterflow operations on the Lions Gate Bridge are in place and only 1 southbound lane is open resulting in significant vehicle queue spillbacks for southbound motorists on Capilano Road and westbound motorists on Marine Drive.

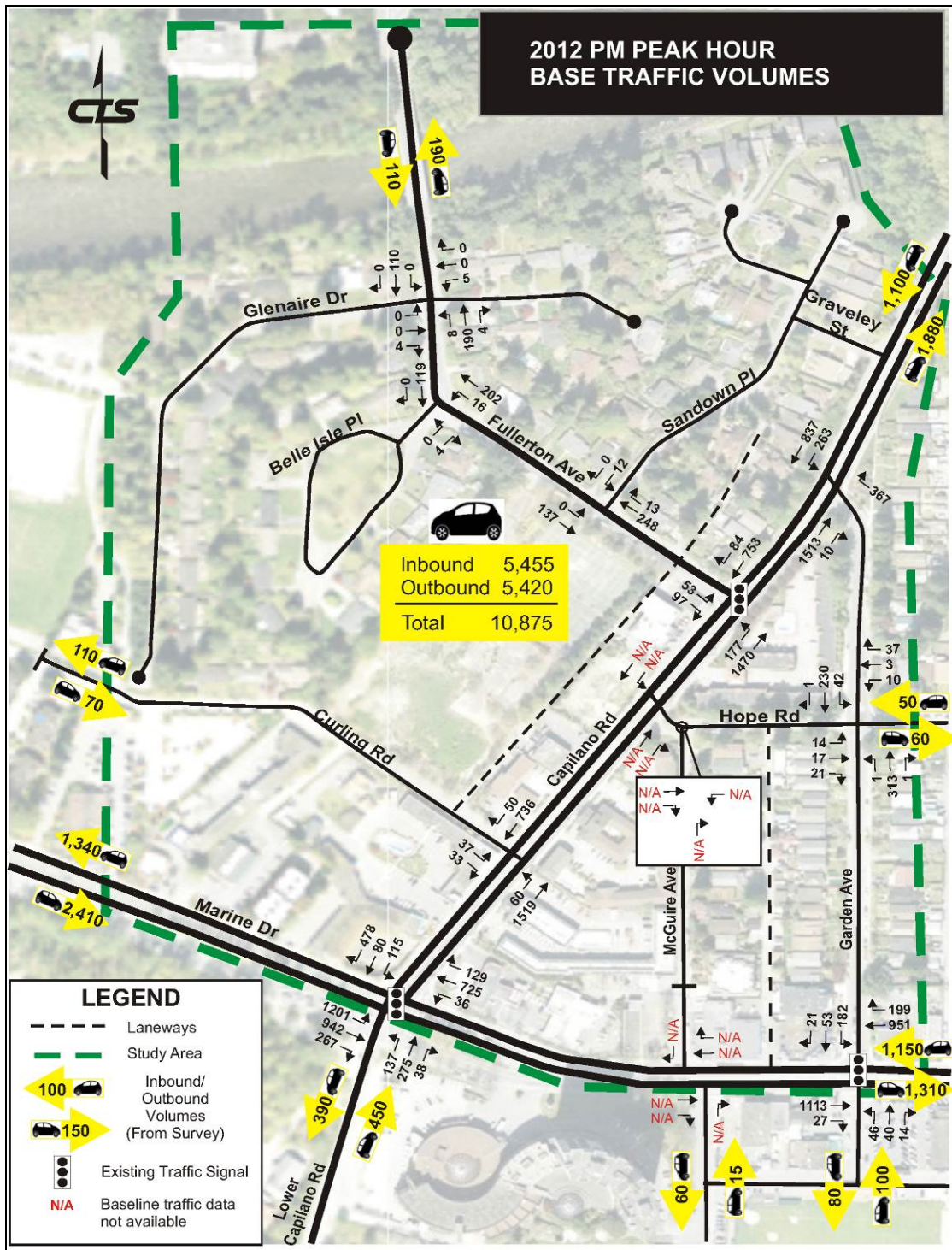
### 2.1 Motorized Vehicles

**FIGURE 2.1** illustrates the year 2012 weekday afternoon peak hour traffic volumes for the motorized vehicles. During the weekday afternoon peak, the study area accommodated 10,875 vehicles trips of which 5,455 veh/hr were inbound and 5,420 veh/hr were outbound. The intersection that carried the most vehicles was Capilano Road & Marine Drive which carried close to 4,400 vehicles in one hour.

### 2.2 Pedestrians

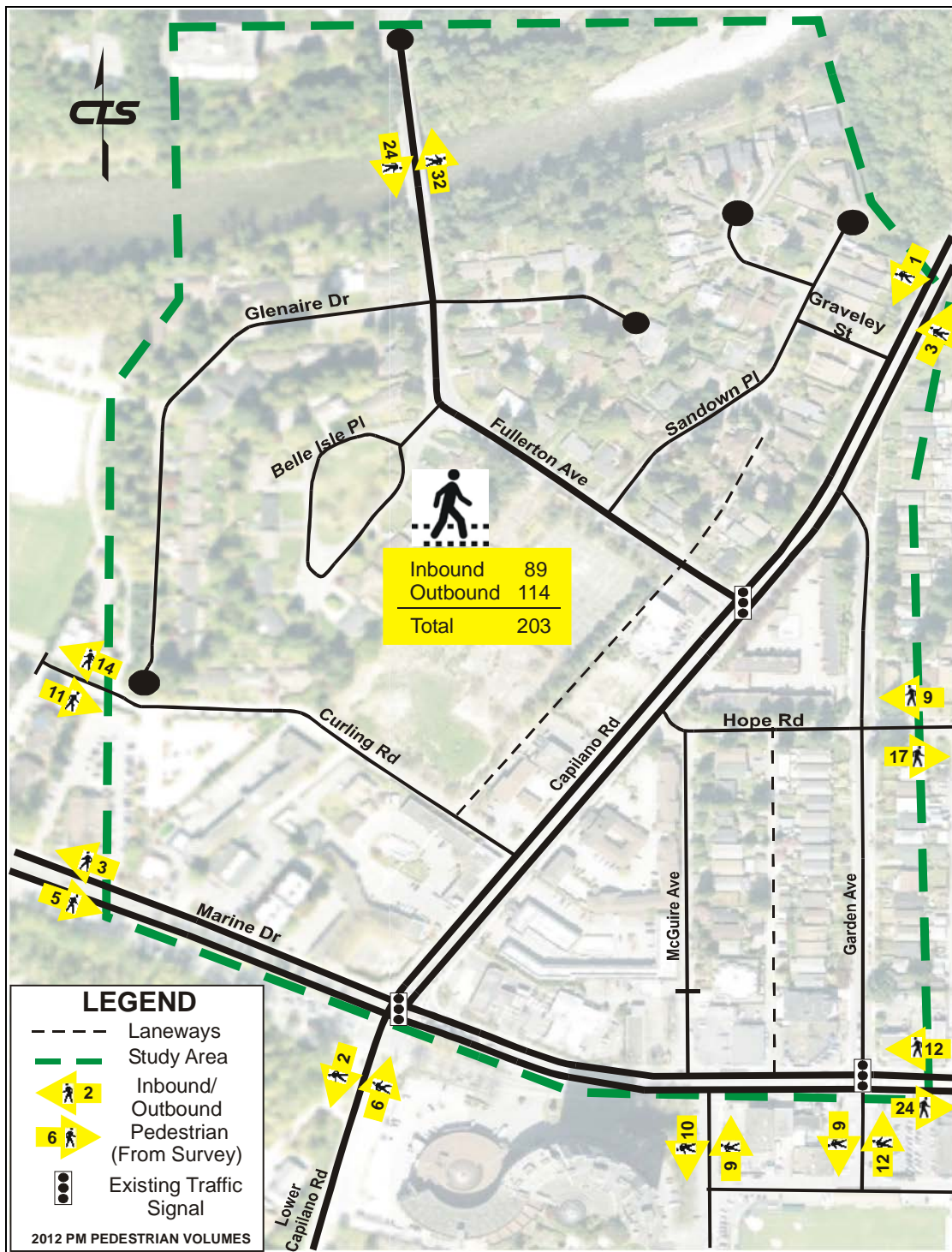
Pedestrians crossing the study boundary were also recorded in order to document existing pedestrian levels entering and existing the study area. **FIGURE 2.2** illustrates the pedestrian volumes recorded during the weekday afternoon. A total of 203 pedestrian movements were observed during the weekday afternoon peak hour of which 99 were inbound and 114 outbound.

**FIGURE 2.1**  
**2012 WEEKDAY AFTERNOON PEAK HOUR TRAFFIC VOLUMES**





**FIGURE 2.2**  
**2012 WEEKDAY AFTERNOON PEAK HOUR PEDESTRIAN VOLUMES**



## 2.3 Bicycles

Peak hour bicycles volumes entering and exiting the study area were also recorded and these are shown on **FIGURE 2.3**. A total of 203 bicycle trips were recorded during the afternoon peak hour of which 106 were inbound and 97 were outbound.

## 2.4 Public Transit

A total of six (6) regular bus routes and one (1) late night bus route provide public transit service in Lower Capilano. These bus routes are located on Capilano Road, Garden Avenue, and Marine Drive nighttime and are illustrated on **FIGURE 2.4**, as well as the location of the current bus stops. **FIGURE 2.4** also illustrates the portion of the study area that is not well serviced by public transit in that the nearest bus stops are in excess of 400 metres away, which is the normal upper range for riders to walk to a bus stop. For the Lower Capilano study area, it is estimated that an excellent 80% of the study area is within 400 metres of a bus stop and that only the lands north of the Capilano River (e.g. the Woodcroft development) are currently outside this threshold.

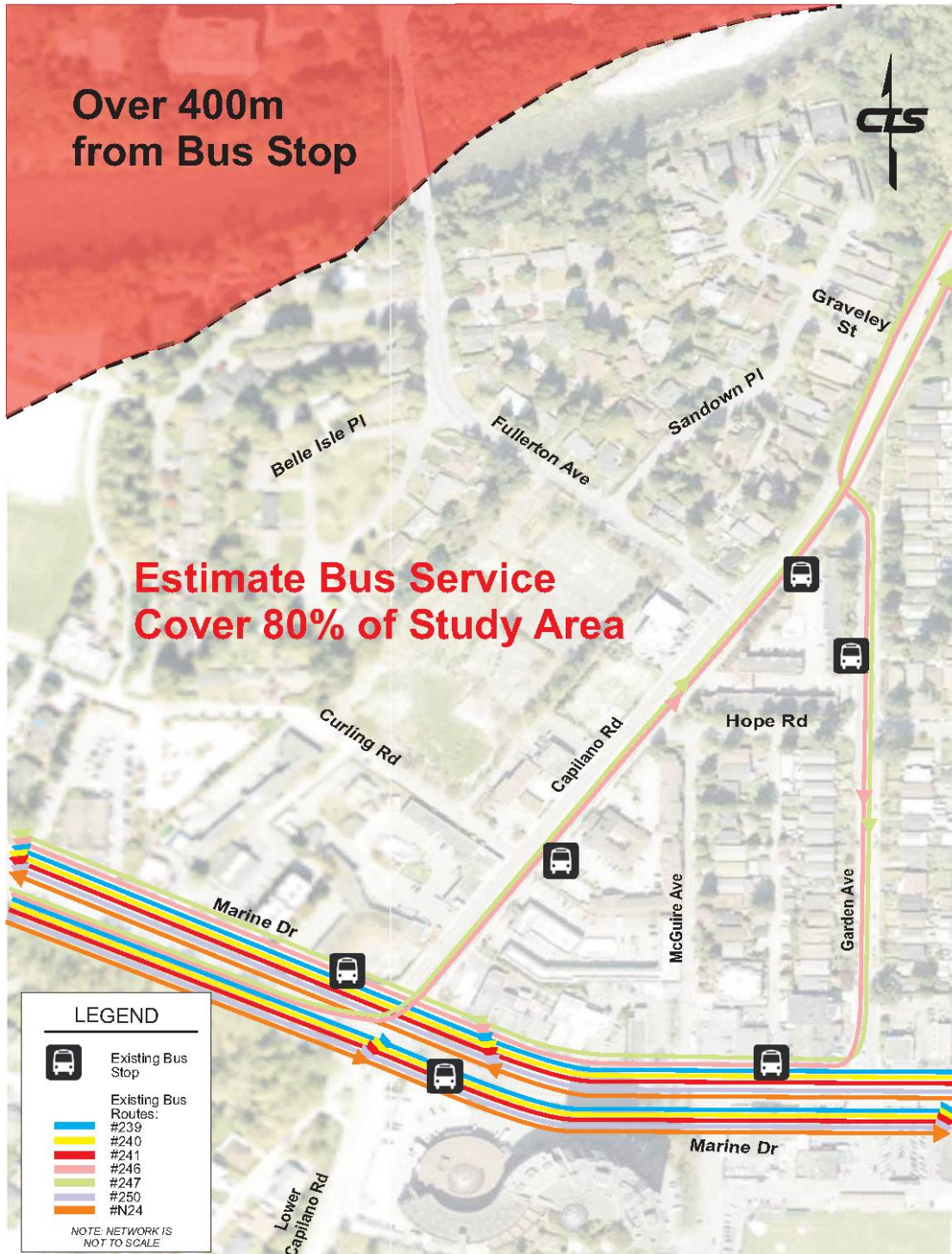
**TABLE 2.1** provides a detailed summary of each bus stop and the bus routes #239, #240, #241, #246, #247, #255, and #N24 t services, as well as the frequency of service. These bus routes provide excellent frequency of service as the bus headways range from 8 minutes to 33 minutes.







**FIGURE 2.4  
EXISTING TRANSIT**



**TABLE 2.1  
EXISTING TRANSIT SERVICE**

Route/Stop		Service Period Adjacent to Site		Service Headways (minutes)		
Route #	Name	Start	End	AM	Mid-day	PM
<b>Stop #61510 Capilano Rd at Curling Rd northbound</b>						
246	Lonsdale Quay/Highland/Vancouver	5:38am	12:21am	15	30	8
247	Upper Capilano/Grouse/Vancouver	8:00am	6:21pm	*	N/A	30
<b>Stop #59990 Capilano Rd at Fullerton Ave northbound</b>						
246	Lonsdale Quay/Highland/Vancouver	5:38am	12:21am	15	30	8
247	Upper Capilano/Grouse/Vancouver	8:00am	6:22pm	*	N/A	30
<b>Stop #54546 - Garden Ave at Hope Rd southbound</b>						
246	Lonsdale Quay/Highland/Vancouver	5:56am	11:33pm	15	30	15
247	Upper Capilano/Grouse/Vancouver	6:59am	8:35am	32	N/A	N/A
<b>Stop #54439 - Marine Dr at Garden Ave westbound</b>						
246	Lonsdale Quay/Highland/Vancouver	5:57am		Unload Only		
239	Capilano University/Park Royal	5:31am	1:49am	10	10	10
255	Dundarave/Capilano University	7:05am	9:32pm	30	30	15
<b>Stop #54440 - Marine Dr at McGuire Ave westbound</b>						
246	Lonsdale Quay/Highland/Vancouver	6:30am	11:34pm	14	30	15
247	Upper Capilano/Grouse/Vancouver	7:00am	8:36am	33	N/A	N/A
240	15th Street/Vancouver	5:40am	12:33am	10	15	8
241	Upper Lonsdale/Vancouver	7:06am	8:43am	9	N/A	N/A
N24	Downtown/Upper Lonsdale Nightbus	1:10am	2:03am	N/A	N/A	50
<b>Stop #54413 - Marine Dr at Capilano Rd eastbound</b>						
246	Lonsdale Quay/Highland/Vancouver	12:31am	6:55pm	Unload Only		
239	Capilano University/Park Royal	5:44am	12:47am	10	10	10
240	15th Street/Vancouver	6:16am	12:54am	8	15	8
241	Upper Lonsdale/Vancouver	3:59pm	7:23pm	N/A	N/A	13
255	Dundarave/Capilano University	6:45am	9:15pm	30	30	15
N24	Downtown/Upper Lonsdale Nightbus	1:23am	3:24am	N/A	N/A	30
<b>Stop #61563 - Marine Dr at Capilano Rd westbound</b>						
246	Lonsdale Quay/Highland/Vancouver	6:30am	11:34pm	14	30	15
247	Upper Capilano/Grouse/Vancouver	7:00am	8:36am	33	N/A	N/A
239	Capilano University/Park Royal	5:31am	1:49am	10	10	10
240	15th Street/Vancouver	5:40am	12:33am	10	15	8
241	Upper Lonsdale/Vancouver	7:06am	8:43am	9	N/A	N/A
255	Dundarave/Capilano University	7:05am	9:32pm	30	30	15
N24	Downtown/Upper Lonsdale Nightbus	1:10am	2:03am	N/A	N/A	50

\* Only one bus runs during this period

## 2.5 Transport Mode

On Wednesday, 19 October 2011, CTS conducted a comprehensive six (6) hour transport mode survey of people entering and exiting Lower Capilano via one of the roadways in order to document the travel mode of choice. The surveys were conducted simultaneously at each station from 06:30-09:30 and from 15:00-18:00 in order to fully capture both the morning and afternoon commuter peaks. A report on the survey findings was issued to the District of North Vancouver by CTS on 10 November 2011. **TABLE 2.2** below summarizes the key findings of the transport mode survey.

**TABLE 2.2  
OBSERVED FALL 2011 PERSON TRIP DEMAND BY TRANSPORT MODE  
ENTERING AND EXITING LOWER CAPILANO**

<b>AM Period (06:30 - 09:30)</b>		<b>PM Period (15:00 - 18:00)</b>		<b>6 Hour Total</b>	
Cars / Trucks	26982	Cars / Trucks	36480	Cars / Trucks	63462
Bus	7363	Bus	8569	Bus	15932
Motorcycle	123	Motorcycle	184	Motorcycle	307
Bicycle	390	Bicycle	404	Bicycle	794
Walk	401	Walk	533	Walk	934
Other*	7	Other*	3	Other*	10
<b>TOTAL</b>	<b>35266</b>	<b>TOTAL</b>	<b>46173</b>	<b>TOTAL</b>	<b>81439</b>

*\* Other vehicles include non motorized scooters, skateboards and construction equipment (eg. Backhoe)*

A total of 81,439 people were counted over the 6 hour survey period entering and/or exiting Lower Capilano area. The afternoon peak period was the dominant of the two 3 hour survey periods as 10,907 more people were observed than in the morning. **TABLE 2.3** illustrates the observed transport mode splits for the morning and afternoon peak hours, as well as for the three and six hour survey periods.

**TABLE 2.3  
OBSERVED FALL 2011 TRANSPORT MODE SPLITS FOR PERSON TRIPS  
ENTERING AND EXITING LOWER CAPILANO**

Time Period	Car / Trucks	Bus	Motorcycle	Bicycle	Walk	Other
AM Peak Hour (1hr)	76.3%	21.2%	0.3%	1.0%	1.2%	0.0%
AM Period (3hrs)	76.5%	20.9%	0.3%	1.1%	1.1%	0.0%
PM Peak Hour (1hr)	79.1%	17.9%	0.5%	1.2%	1.2%	0.0%
PM Period (3hrs)	79.0%	18.6%	0.4%	0.9%	1.2%	0.0%
<b>6 Hour Total</b>	<b>77.9%</b>	<b>19.6%</b>	<b>0.4%</b>	<b>1.0%</b>	<b>1.1%</b>	<b>0.0%</b>

The 6 hour total modal split shows that 77.9% of people in the Lower Capilano area used the automobile as their primary mode of transport, 19.6% used public transit, and the remaining 2.5% utilized either motorcycles, bicycles or walked.

SECTION  
**3**

## FUTURE BASE TRAFFIC VOLUMES

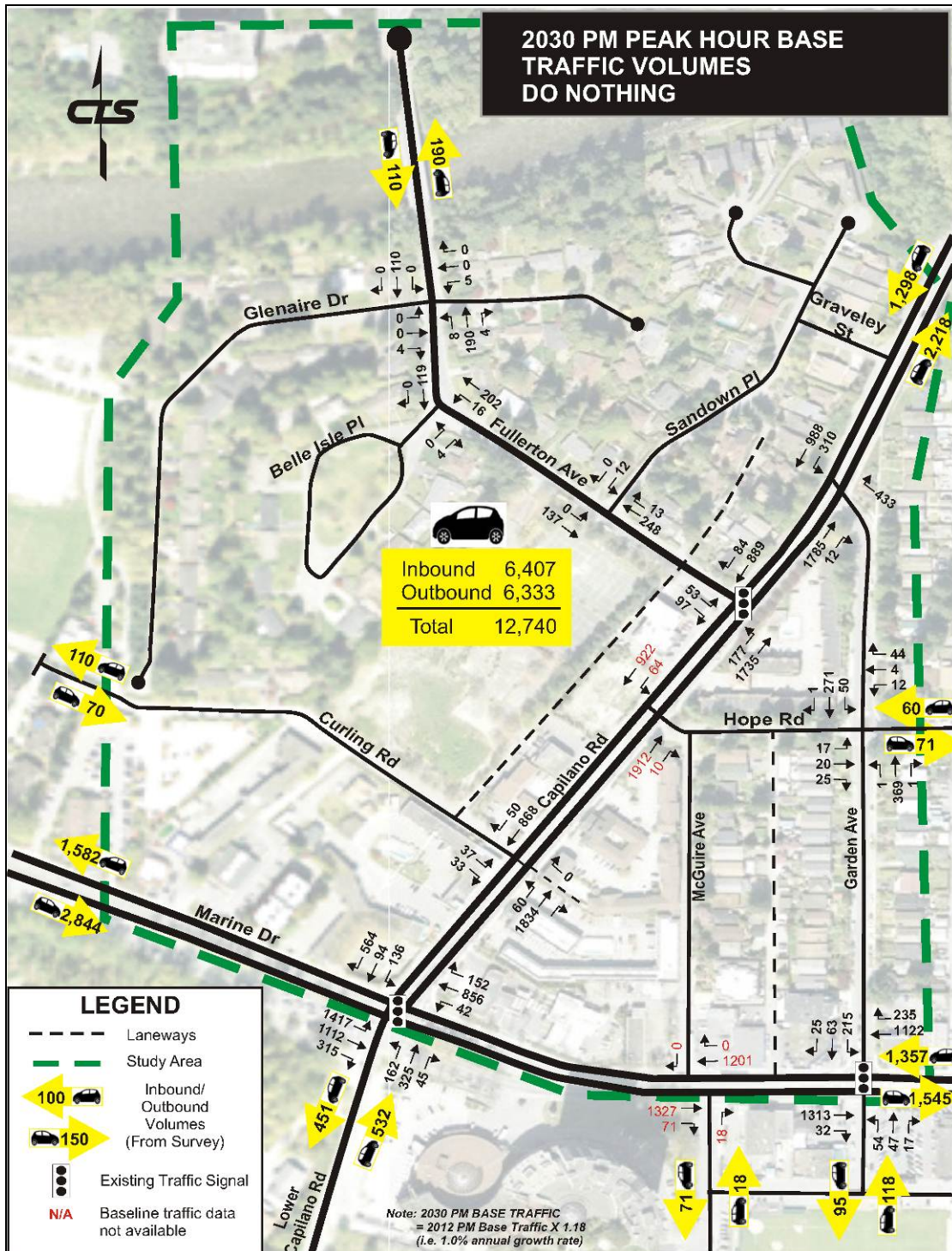
### 3.1 Future Year 2030 Base Traffic Volumes

Year 2030 is anticipated to be the completion year for the proposed Lower Capilano Marine Village Centre. In order to create future baseline conditions to which different transport plans could be compared against, the 2012 base weekday afternoon peak hour volumes factored up by an approved traffic volume growth rate of 1.0% per annum (simple straight line). Of note, this factor was only applied to the regional traffic on Capilano Road and Marine Drive as it was assumed that side street volumes would remain the same as the land uses were not changing for the “do-nothing” scenario.

**FIGURE 3.1** illustrates the projected 2030 weekday afternoon peak hour volumes for the future base condition with no redevelopment of Lower Capilano. The total volume of regional traffic entering and exiting Lower Capilano is projected to increase by 17% from 10,875 to 12,740 (or +1,865 cars) during the weekday afternoon peak hour between the year 2012 and 2030.



**FIGURE 3.1  
2030 BACKGROUND TRAFFIC VOLUMES**



SECTION  
**4**

**REDEVELOPMENT OF LOWER CAPILANO**

**4.1 Year 2012 Land Use**

Using the traffic zone boundaries illustrated in **FIGURE 1.2**, the District of North Vancouver prepared a summary of the existing land uses in the study area broken down into the following key categories:

1. Single Family Housing;
2. Multi-Family Housing;
3. Seniors Housing;
4. Commercial Retail;
5. Office; and
6. Accommodation.

**TABLE 4.1** summarizes the 2012 land use information by traffic zone as provided by the District of North Vancouver.

**TABLE 4.1  
SUMMARY OF YEAR 2012 KEY LAND USE STATISTICS BY TRAFFIC ZONE**

ZONE	EXISTING (Year 2012)					
	Single-family Housing	Multi-family Housing	Seniors Housing	Retail Store	Offices	Hotel / Motel / Inn
	Dwelling Units	Dwelling Units	Dwelling Units	GFA(sq m)	GFA(sq m)	(Rooms)
1	3	0	0	826	2540	140
2	0	0	0	1471	0	168
3	27	26	0	1403	316	0
4	0	0	0	0	0	0
5	0	0	0	1172	643	0
6	0	0	0	0	0	72
7	20	0	0	0	0	0
8	14	0	0	0	0	0
9	14	0	0	0	0	0
10	41	1	0	0	0	0
11	0	1300	0	0	0	0
<b>Total</b>	<b>119</b>	<b>1327</b>	<b>0</b>	<b>4872</b>	<b>3499</b>	<b>380</b>

As of 2012, there were a total of 1446 dwelling units, 4,872 square metres of commercial retail space, 3,499 square metres of office space and 380 motel / hotel rooms in the Lower Capilano study area.

#### 4.2 Year 2030 Future Land Use

**TABLE 4.2** summarizes the estimated year 2030 land use information by traffic zone after redevelopment as provided by the District of North Vancouver. For the Year 2030, a total of 2,960 dwelling units, 120 seniors housing units, 11,050 square metres of commercial retail space, 2,500 square metres of office space and 230 motel / hotel rooms are forecast for the Lower Capilano study area.

**TABLE 4.2  
PROPOSED YEAR 2030 KEY LAND USES BY TRAFFIC ZONE**

ZONE	FUTURE (Buildout)					
	Single-family Housing	Multi-family Housing	Seniors Housing	Retail Store	Offices	Hotel / Motel / Inn
	Dwelling Units	Dwelling Units	Dwelling Units	GFA(sq m)	GFA(sq m)	(Rooms)
1	0	400	60	3,500	1,300	80
2	0	200	0	500	0	150
3	0	80	0	3,000	300	0
4	0	400	60	650	0	0
5	0	90	0	3,000	900	0
6	0	80	0	400	0	0
7	7	110	0	0	0	0
8	0	110	0	0	0	0
9	10	12	0	0	0	0
10	23	138	0	0	0	0
11	0	1300	0	0	0	0
<b>Total</b>	<b>40</b>	<b>2920</b>	<b>120</b>	<b>11,050</b>	<b>2,500</b>	<b>230</b>

### 4.3 Net Change in Key Land Uses from Redevelopment

**TABLE 4.3** summarizes the net change in key land uses by traffic zones between the existing and proposed redevelopment of Lower Capilano. From **TABLE 4.3**, a reduction of 79 single family homes, a net increase of 1,593 multi-family homes, 120 new senior citizen dwelling units, an additional 6,178 square meters of commercial retail space, and a reduction of both 999 square metres of office space and 150 accommodation units is forecast by the District of North Vancouver by the year 2030.

Note: For zones 7 to 10, very rough worst case numbers were included. DNV will be working with the community to establish the vision and detailed plan for those areas and projects will be adjusted accordingly.

#### NET CHANGE IN KEY LAND USES BETWEEN 2012 AND 2030

ZONE	NET CHANGE BETWEEN 2012 AND 2030					
	Single-family Housing	Multi-family Housing	Seniors Housing	Retail Store	Offices	Hotel / Motel / Inn
	Dwelling Units	Dwelling Units	Dwelling Units	GFA (sq m)	GFA (sq m)	(Rooms)
1	-3	400	60	2674	-1240	-60
2	0	200	0	-971	0	-18
3	-27	54	0	1597	-16	0
4	0	400	60	650	0	0
5	0	90	0	1828	257	0
6	0	80	0	400	0	-72
7	-13	110	0	0	0	0
8	-14	110	0	0	0	0
9	-4	12	0	0	0	0
10	-18	137	0	0	0	0
11	0	0	0	0	0	0
<b>Total</b>	<b>-79</b>	<b>1593</b>	<b>120</b>	<b>6178</b>	<b>-999</b>	<b>-150</b>

### 4.4 Traffic Generation

Although the ultimate objective is to develop a multi-modal transport plan with less emphasis on vehicles, it is recognized that the private automobile will be a dominant mode of transport in North Vancouver for the foreseeable future. Therefore, for the purposes of developing a first draft of the transport plan, it was assumed that today's vehicle trip generation characteristics for North Vancouver would remain unchanged as

a worst case scenario. To develop traffic volume forecasts for Lower Capilano, the following vehicle trip generation rates were used in this study:

- Multi-family housing → used the average of measured vehicle trip generation rates for the Woodcroft complex from 2009 and 2012; and
- All other land uses → Used the Institute of Transportation Engineers (ITE) vehicle trip generation rates (8<sup>th</sup> edition) to estimate the proposed site traffic volumes.

As the majority of ITE vehicle trip generation rates are based predominantly on suburban United States proxy site locations, use of such rates is considered to represent the worst case scenario as it assumes that most person trips are done by private automobile. **TABLE 4.4** summarizes the vehicle trip generation rates used in this study.

**TABLE 4.4  
VEHICLE TRIP GENERATION FOR THE WEEKDAY AFTERNOON PEAK HOUR**

Land Use	Trip Generation Variable	Scope of Development	Peak Hour	Trip Generation Rate	Trip Rate Source	Directional Split		Peak Hour Volumes (vph)		
						% IN	% OUT	IN	OUT	Total
Single-Family Housing	Dwelling Units	-79.0	Weekday Afternoon	1.01	ITE (8th Ed), Code 210	63%	37%	-51	-32	-83
Multi-Family Housing	Dwelling Units	1593.0	Weekday Afternoon	0.22	Woodcroft	64%	36%	226	129	355
Seniors Housing	Dwelling Units	120.0	Weekday Afternoon	0.16	ITE (8th Ed), Code 252	63%	38%	12	8	20
Retail Store	1000 GFA (sq ft)	66.5	Weekday Afternoon	6.00	ITE (8th Ed), Code 820	49%	51%	194	204	398
Offices	1000 GFA (sq ft)	-10.8	Weekday Afternoon	1.49	ITE (8th Ed), Code 710	17%	83%	-2	-14	-16
Hotel / Motel / Inn	Rooms	-150.0	Weekday Afternoon	0.59	ITE (8th Ed), Code 310	53%	47%	-48	-44	-92
<b>TOTAL NET INCREASED TRIP GENERATION TRAFFIC - WEEKDAY AFTERNOON PEAK HOUR</b>								<b>331</b>	<b>251</b>	<b>582</b>



**TABLE 4.4** also summarizes the projected traffic volumes for the weekday afternoon peak hour by land use for the study area assuming full redevelopment by the year 2030. From **TABLE 4.4**, the proposed redevelopment of Lower Capilano is forecast to add 582 additional vehicle trips (i.e. 331 vehicles inbound and 251 vehicles outbound) to the road network during the weekday afternoon peak hour, assuming no change in travel behavior. This increase in vehicle demand is equivalent to an additional 9.7 vehicle movements per minute, which given the size of the study area, is not considered significant.

#### 4.5 Traffic Volume Forecast by Traffic Zone

Using the existing land use summarized in **TABLE 4.1** and the vehicle trip generation rates from **TABLE 4.4**, it is estimated that Lower Capilano currently generates 1,028 vehicle trips (i.e. 552 vehicles inbound and 476 vehicles outbound) during the weekday afternoon peak hour as summarized in **TABLE 4.5**.

**TABLE 4.5**  
**EXISTING 2-WAY GENERATED TRAFFIC VOLUMES FOR LOWER CAPILANO**

ZONE	TWO WAY TRAFFIC VOLUMES (from existing land use)						
	Single-family Housing	Multi-family Housing	Seniors Housing	Retail Store	Offices	Hotel / Motel / Inn	TOTAL
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
1	4	0	0	55	41	84	184
2	0	0	0	96	0	101	197
3	28	7	0	92	6	0	133
4	0	0	0	0	0	0	0
5	0	0	0	77	11	0	88
6	0	0	0	0	0	44	44
7	21	0	0	0	0	0	21
8	15	0	0	0	0	0	15
9	15	0	0	0	0	0	15
10	43	2	0	0	0	0	45
11	0	286	0	0	0	0	286
<b>Total</b>	<b>126</b>	<b>295</b>	<b>0</b>	<b>320</b>	<b>58</b>	<b>229</b>	<b>1028</b>

Using the future land use summarized in **TABLE 4.2** and the vehicle trip generation rates from **TABLE 4.4**, it is estimated that Lower Capilano will generate a total of 1,610 vehicle trips (i.e. 883 vehicles inbound and 727 vehicles outbound) during the year 2030 weekday afternoon peak hour after redevelopment as summarized in **TABLE 4.6**.

**TABLE 4.6  
FUTURE 2-WAY GENERATED TRAFFIC VOLUMES FOR LOWER CAPILANO**

ZONE	TWO WAY TRAFFIC VOLUMES (from future land use)						
	Single-family Housing	Multi-family Housing	Seniors Housing	Retail Store	Offices	Hotel / Motel / Inn	TOTAL
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
1	0	88	10	227	22	48	395
2	0	44	0	33	0	89	166
3	0	19	0	194	5	0	218
4	0	88	10	43	0	0	141
5	0	21	0	194	15	0	230
6	0	19	0	27	0	0	46
7	8	25	0	0	0	0	33
8	0	25	0	0	0	0	25
9	11	3	0	0	0	0	14
10	24	32	0	0	0	0	56
11	0	286	0	0	0	0	286
<b>Total</b>	<b>43</b>	<b>650</b>	<b>20</b>	<b>718</b>	<b>42</b>	<b>137</b>	<b>1610</b>

#### 4.6 Net Change in Traffic Volume Forecast by Traffic Zone

**TABLE 4.7** summarizes the projected net change in traffic volumes by land use by traffic zone with the redevelopment of Lower Capilano by the year 2030. It is estimated that Lower Capilano will see generate a net increase of 582 vehicle trips (i.e. 331 vehicles inbound and 251 vehicles outbound) during the year 2030 weekday afternoon peak hour after redevelopment.

**TABLE 4.7**  
**NET CHANGE IN 2 WAY GENERATED TRAFFIC VOLUMES FOR THE YEAR 2030\***

ZONE	TWO WAY TRAFFIC VOLUMES (net change)						
	Single-family Housing	Multi-family Housing	Seniors Housing	Retail Store	Offices	Hotel / Motel / Inn	TOTAL
	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr	veh/hr
1	-4	88	10	172	-19	-36	211
2	0	44	0	-63	0	-12	-31
3	-28	12	0	102	-1	0	85
4	0	88	10	43	0	0	141
5	0	21	0	117	4	0	142
6	0	19	0	27	0	-44	2
7	-13	25	0	0	0	0	12
8	-15	25	0	0	0	0	10
9	-4	3	0	0	0	0	-1
10	-19	30	0	0	0	0	11
11	0	0	0	0	0	0	0
<b>Total</b>	<b>-83</b>	<b>355</b>	<b>20</b>	<b>398</b>	<b>-16</b>	<b>-92</b>	<b>582</b>

\* Orange highlighted traffic zones represent 85% of the new traffic volumes forecast to be generated.

In reviewing **TABLE 4.7**, the following is noted:

- 3 of the key land uses will see a decrease in traffic volumes due to the reduction in land use scope;
- 1 of the traffic zones will see a net decrease in traffic volumes due to the land use changing to a less traffic intensive nature; and
- Traffic zones 1, 4 and 5 will generate 85% of the new traffic estimated for the study area, all of which are located on the west side of Capilano Road.

SECTION  
**5**

## TRANSPORT PLAN OPTIONS

### 5.1 The Challenge

Although Lower Capilano is bisected by two major roads and has a number of entry and exit points, there are a number of key geographical, jurisdictional and topographical challenges that make the development of a viable transport plan for both current and future conditions challenging. These challenges include the following:

- 1) Frequent recurring vehicle queue spillbacks from the Lions Gate Bridge that restrict traffic travelling southbound on Capilano Road and westbound on Marine Drive;
- 2) The limited number of bridges over the Capilano River to the west and north;
- 3) The limited number of road connections with the District of West Vancouver to the west and north;
- 4) Future public vehicle access to Marine Drive west of Capilano Road will be prohibited due to the bus lane and its proximity to the Lions Gate Bridge;
- 5) Regional traffic, which is estimated to be 94.5% of all traffic currently driving through Lower Capilano, is expected to continue to increase for the foreseeable future;
- 6) The use of the private automobile is the dominant mode of transport on the North Shore and is forecast to remain so for the foreseeable future;
- 7) Bus and bike facilities need to be significantly enhanced in order to reduce the reliance of North Shore residents on the private automobile and to ensure that alternative modes of transport become viable options; and
- 8) 85% of the new traffic estimated to be generated by the redevelopment would come from properties on the west side of Capilano Road triggering the need for significant improved vehicle accessibility.

In reviewing the above challenges, the CTS project team in consultation with municipal staff developed the following five (5) network options to test against the proposed redevelopment plans for Lower Capilano for the year 2030:

- Do Nothing
- Do Something: Option 1 – Crossroads
- Do Something: Option 2 – Signalize Intersection of Capilano Rd. & Curling Rd
- Do Something: Option 3 – Curling Road Extension to Garden Ave
- Do Something: Option 4: Curling / McGuire Connector

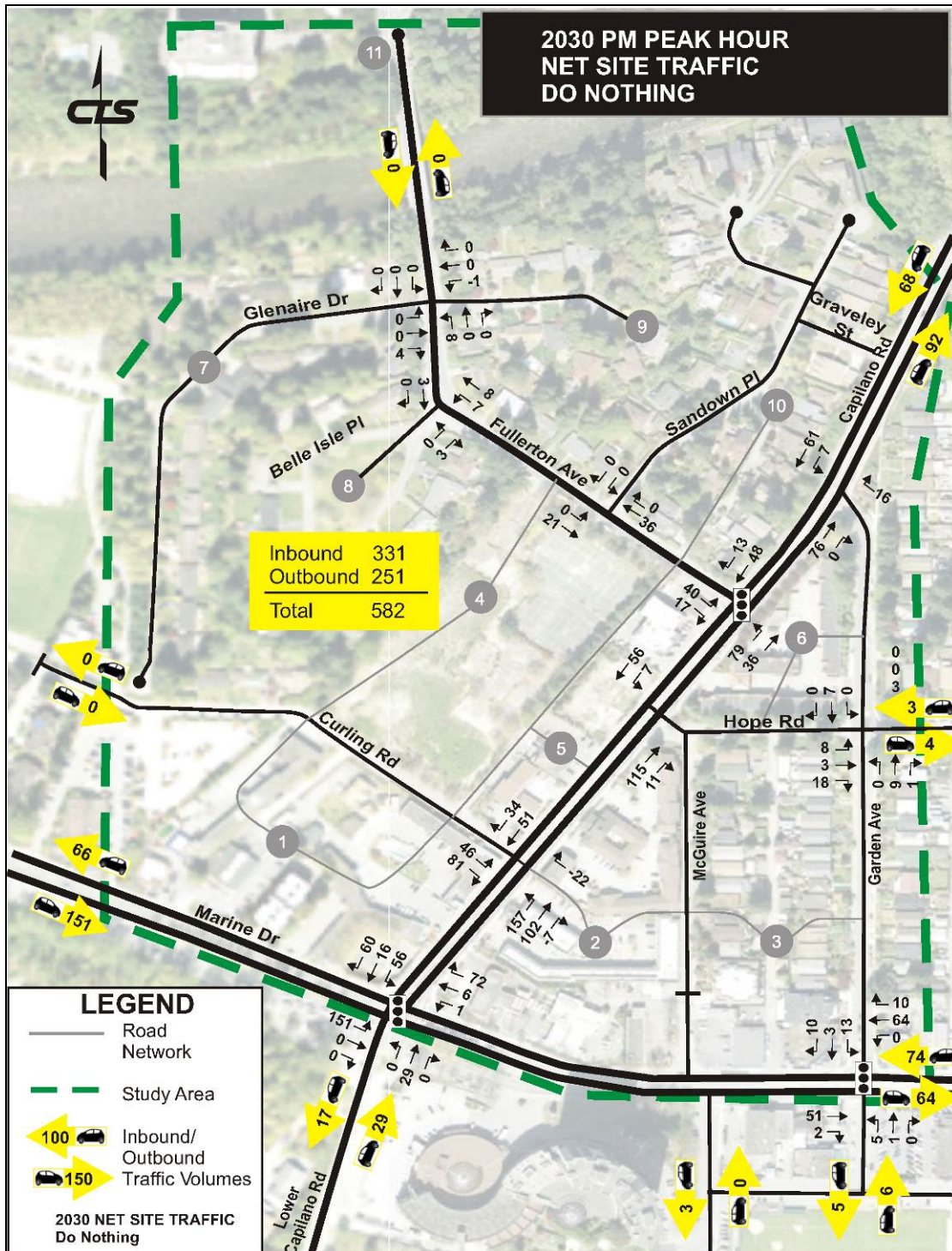
The Do-Nothing scenario is important in that it provides baseline conditions to compare the four “Do-Something” scenarios to.

## 5.2 Do Nothing

For the Do Nothing case, it is assumed that no road improvements will be made. **FIGURE 5.1** illustrates the site generated traffic volumes during the weekday afternoon peak hour. **FIGURE 5.2** illustrates the 2030 base + site traffic volumes which is the result of superimposing **FIGURE 5.2** onto **FIGURE 3.1**. **FIGURE 5.3** illustrates the laning configuration for the Do Nothing scenario.



**FIGURE 5.1  
NET SITE GENERATED TRAFFIC VOLUMES – DO NOTHING**



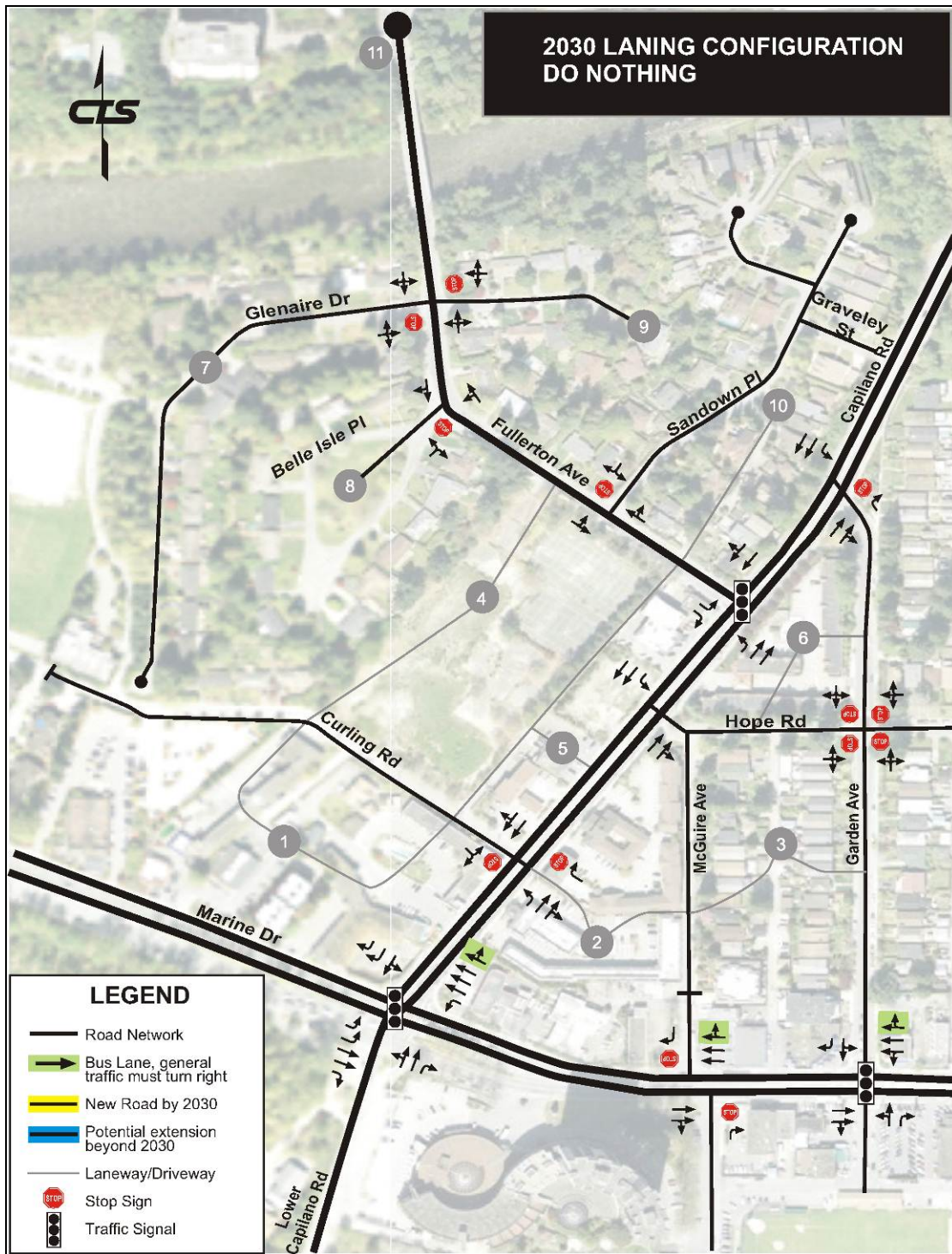


**FIGURE 5.2**  
**2030 BASE + SITE TRAFFIC VOLUMES – DO NOTHING**





**FIGURE 5.3  
ASSUMED LANING CONFIGURATION – DO NOTHING**



### 5.3 Option 1 – Crossroads

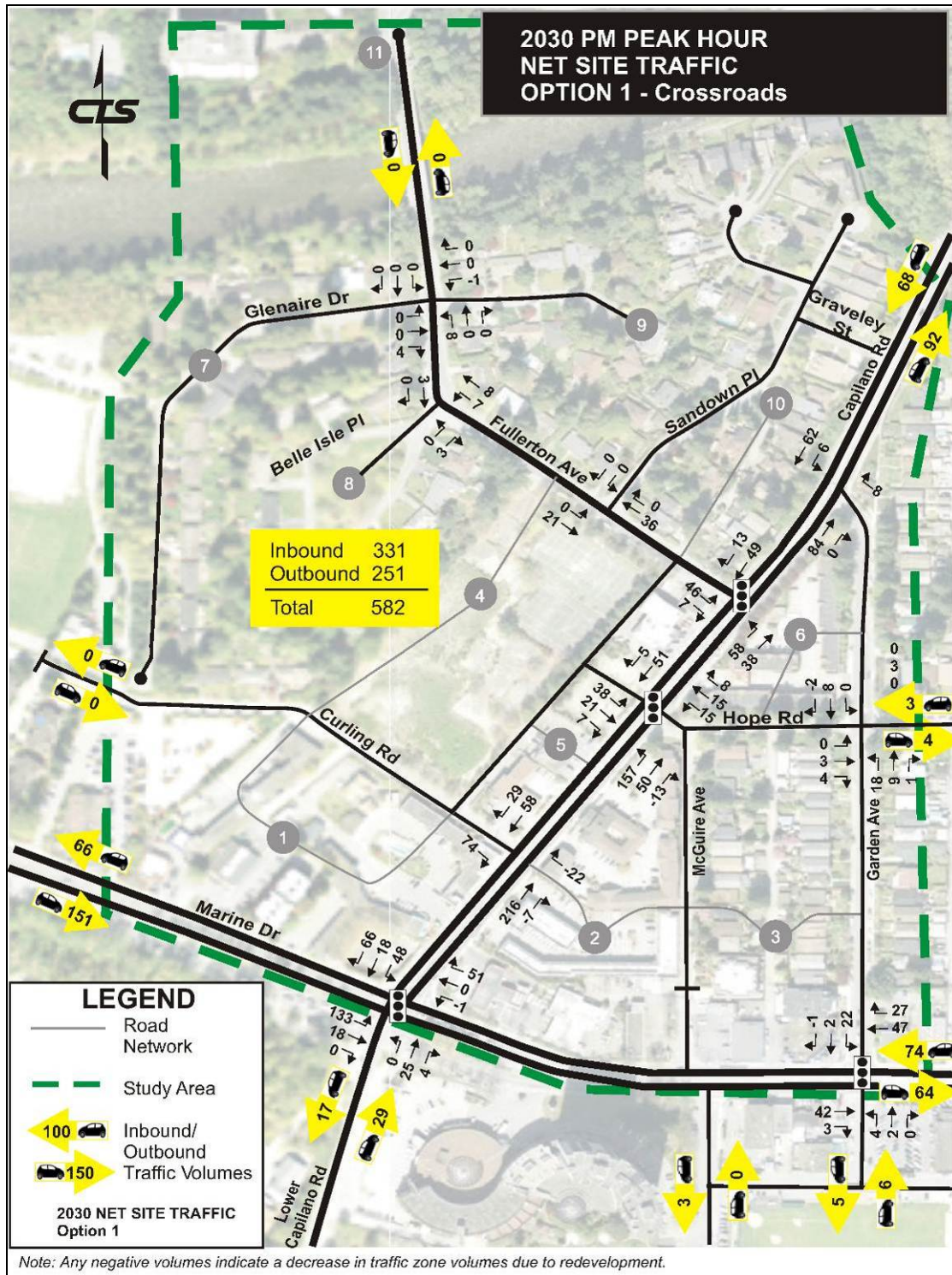
Option 1 is the original Crossroads concept developed with the community where a new east-west road links Hope Road and Garden Avenue to the east with the redevelopment lands west of Capilano Road. Key network changes to this concept are as follows:

1. Hope Road is extended westwards across Capilano Road into the redeveloped lands;
2. The intersection of Capilano Road & Hope Road is signalized;
3. A new north-south local road is constructed between Fullerton Avenue and Curling Avenue west of Capilano Road providing access to the redeveloped parcels; and
4. A new southbound bus lane is constructed from Capilano Road via Curling Road to Marine Drive so that buses can bypass the intersection of Capilano Road & Marine Drive.

**FIGURE 5.4** illustrates the site generated traffic volumes during the weekday afternoon peak hour. **FIGURE 5.5** illustrates the 2030 base + site traffic volumes which is the result of superimposing **FIGURE 5.4** onto **FIGURE 3.1** with the reassigned traffic. **FIGURE 5.6** illustrates the laning configuration for the Option 1 scenario



**FIGURE 5.4  
NET SITE GENERATED TRAFFIC VOLUMES – OPTION 1**



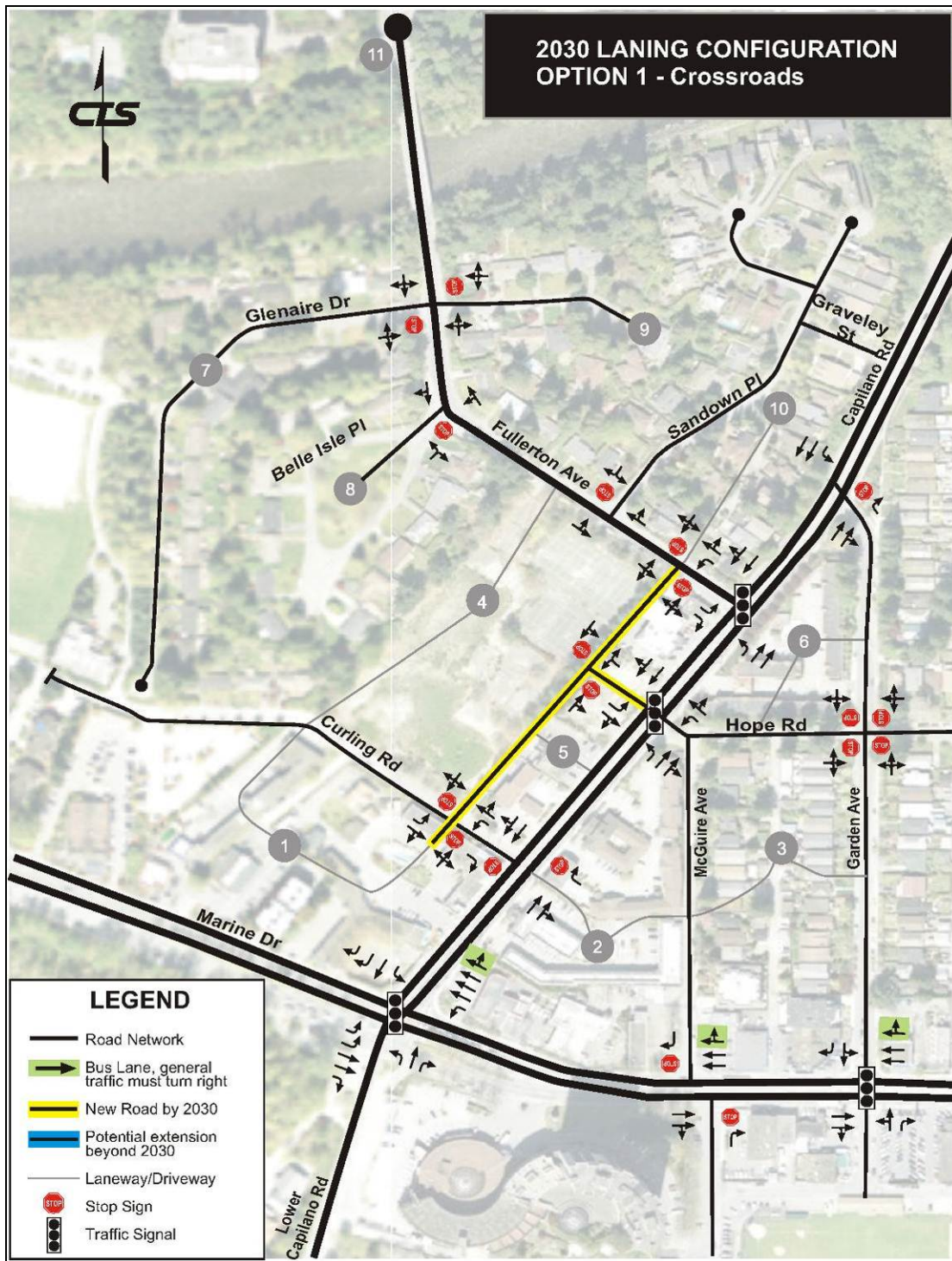


**FIGURE 5.5**  
**2030 BASE + SITE TRAFFIC VOLUMES – OPTION 1**





**FIGURE 5.6  
ASSUMED LANING CONFIGURATION – OPTION 1**



#### 5.4 Option 2 – Signalize Intersection of Capilano Rd & Curling Rd

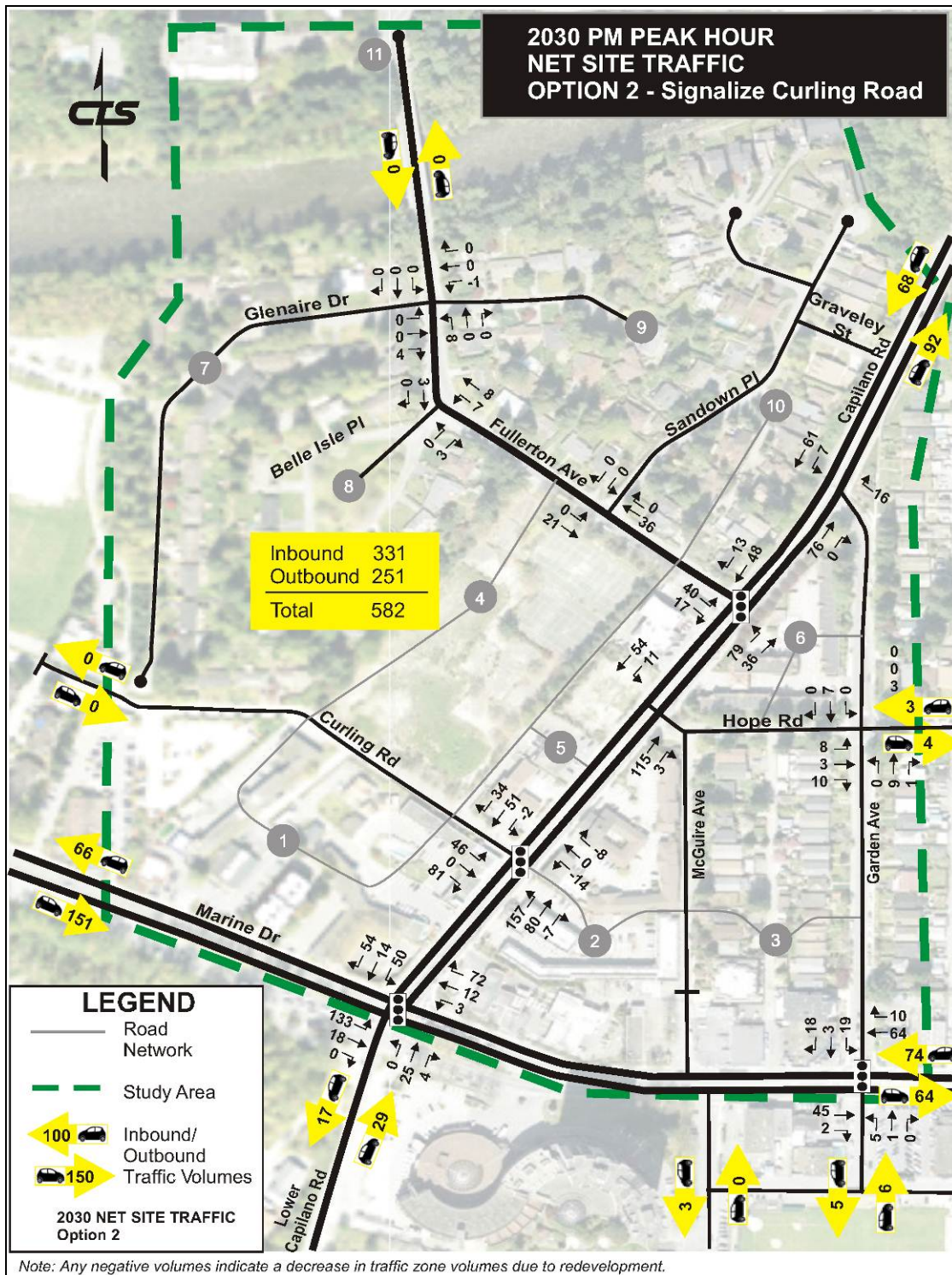
Option 2 involves the signalization of the intersection of Capilano Road & Curling Avenue in order to provide improved vehicle accessibility to and from the lands west of Capilano Road. Key network changes to this concept are as follows:

1. The intersection of Capilano Road & Curling Avenue is signalized;
2. A new north-south local road is constructed between Fullerton Avenue and Curling Avenue west of Capilano Road providing access to the redeveloped parcels; and
3. A new southbound bus lane is constructed from Capilano Road via Curling Road to Marine Drive so that buses can bypass the intersection of Capilano Road & Marine Drive.

**FIGURE 5.7** illustrates the site generated traffic volumes during the weekday afternoon peak hour. **FIGURE 5.8** illustrates the 2030 base + site traffic volumes which is the result of superimposing **FIGURE 5.7** onto **FIGURE 3.1** with the reassigned traffic. **FIGURE 5.9** illustrates the laning configuration for the Option 2 scenario



**FIGURE 5.7  
NET SITE GENERATED TRAFFIC VOLUMES – OPTION 2**





**FIGURE 5.8**  
**2030 BASE + SITE TRAFFIC VOLUMES – OPTION 2**





**FIGURE 5.9  
ASSUMED LANING CONFIGURATION - OPTION 2**



## 5.5 Option 3 – Curling Road Extension to Garden Avenue

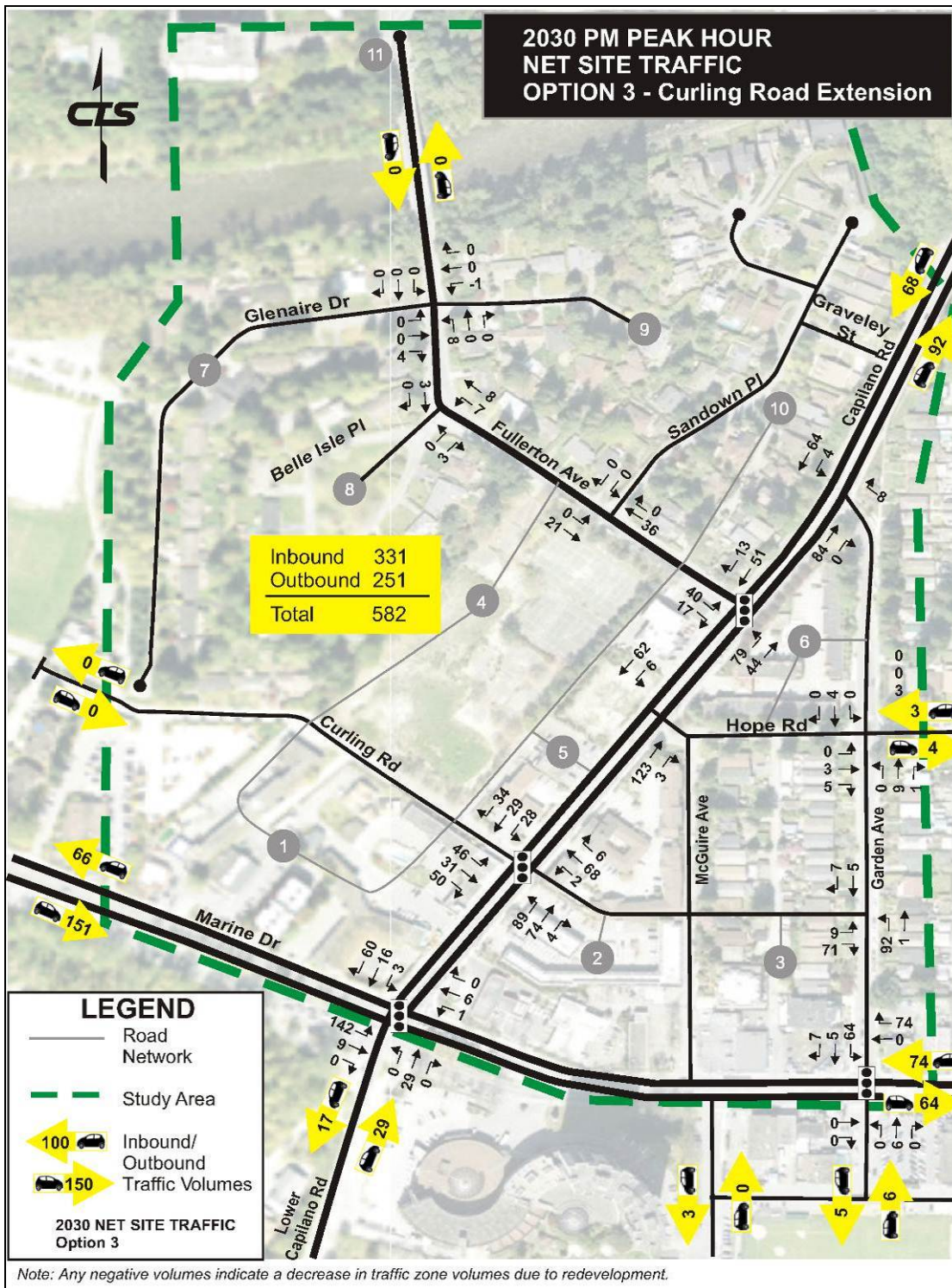
Option 3 involves the signalization of the intersection of Capilano Road & Curling Avenue and extending Curling Avenue eastwards to Garden Avenue in order to create a new parallel road adjacent to Marine Drive that provides improved east-west connectivity and provides access to all the redeveloped lands. Key network changes to this concept are as follows:

1. The intersection of Capilano Road & Curling Avenue is signalized;
2. Curling Avenue is extended from Capilano Road to Garden Avenue;
3. A new north-south local road is constructed between Fullerton Avenue and Curling Avenue west of Capilano Road providing access to the redeveloped parcels;
4. A new southbound bus lane is constructed from Capilano Road via Curling Road to Marine Drive so that buses can bypass the intersection of Capilano Road & Marine Drive; and
5. Dual southbound left turn lanes are required on Garden Avenue @ Marine Drive.

**FIGURE 5.10** illustrates the site generated traffic volumes during the weekday afternoon peak hour. **FIGURE 5.11** illustrates the 2030 base + site traffic volumes which is the result of superimposing **FIGURE 5.10** onto **FIGURE 3.1** with the reassigned traffic. **FIGURE 5.12** illustrates the laning configuration for the Option 3 scenario



**FIGURE 5.10  
NET SITE GENERATED TRAFFIC VOLUMES – OPTION 3**



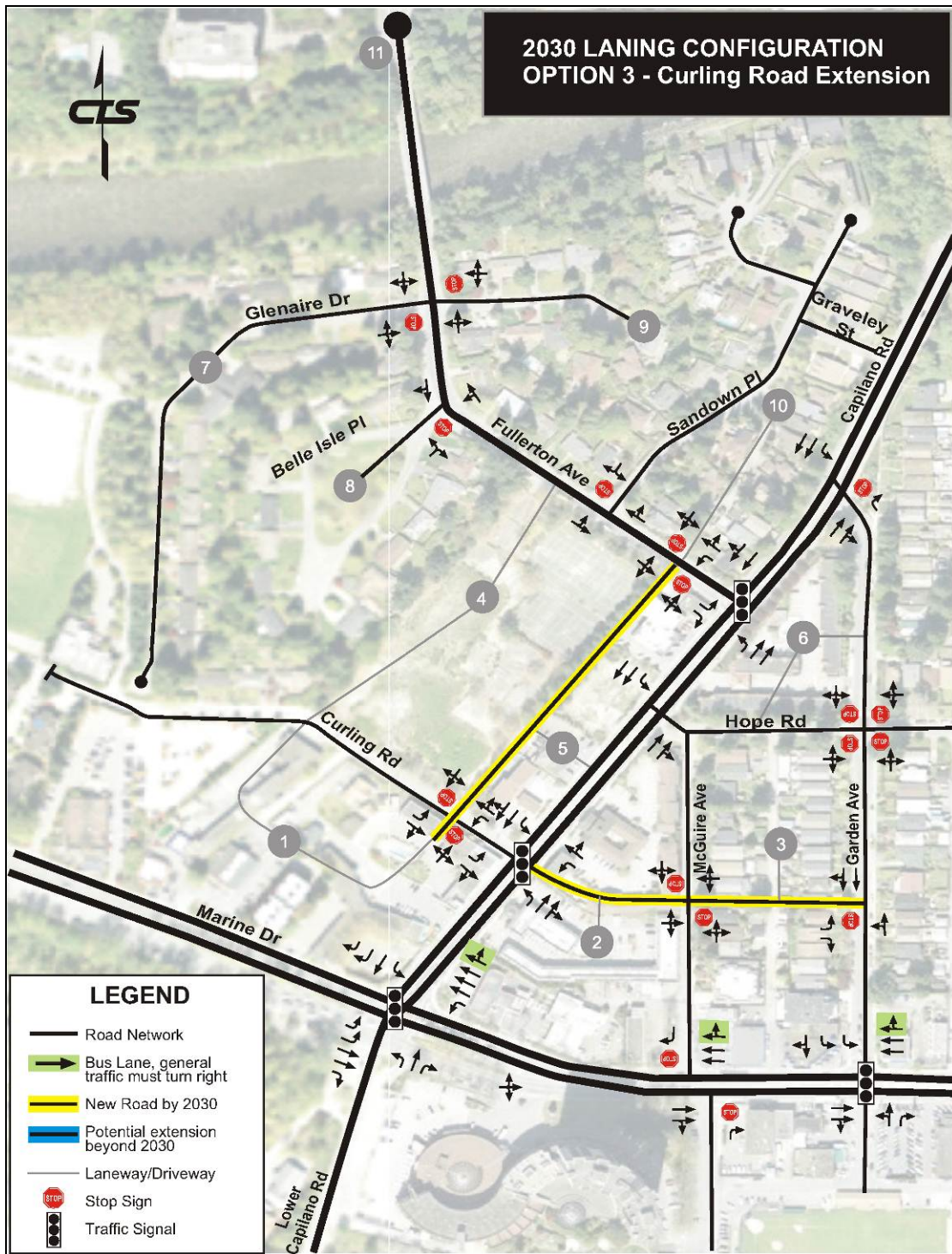


**FIGURE 5.11**  
**2030 BASE + SITE TRAFFIC VOLUMES – OPTION 3**





**FIGURE 5.12  
ASSUMED LANING CONFIGURATION - OPTION 3**





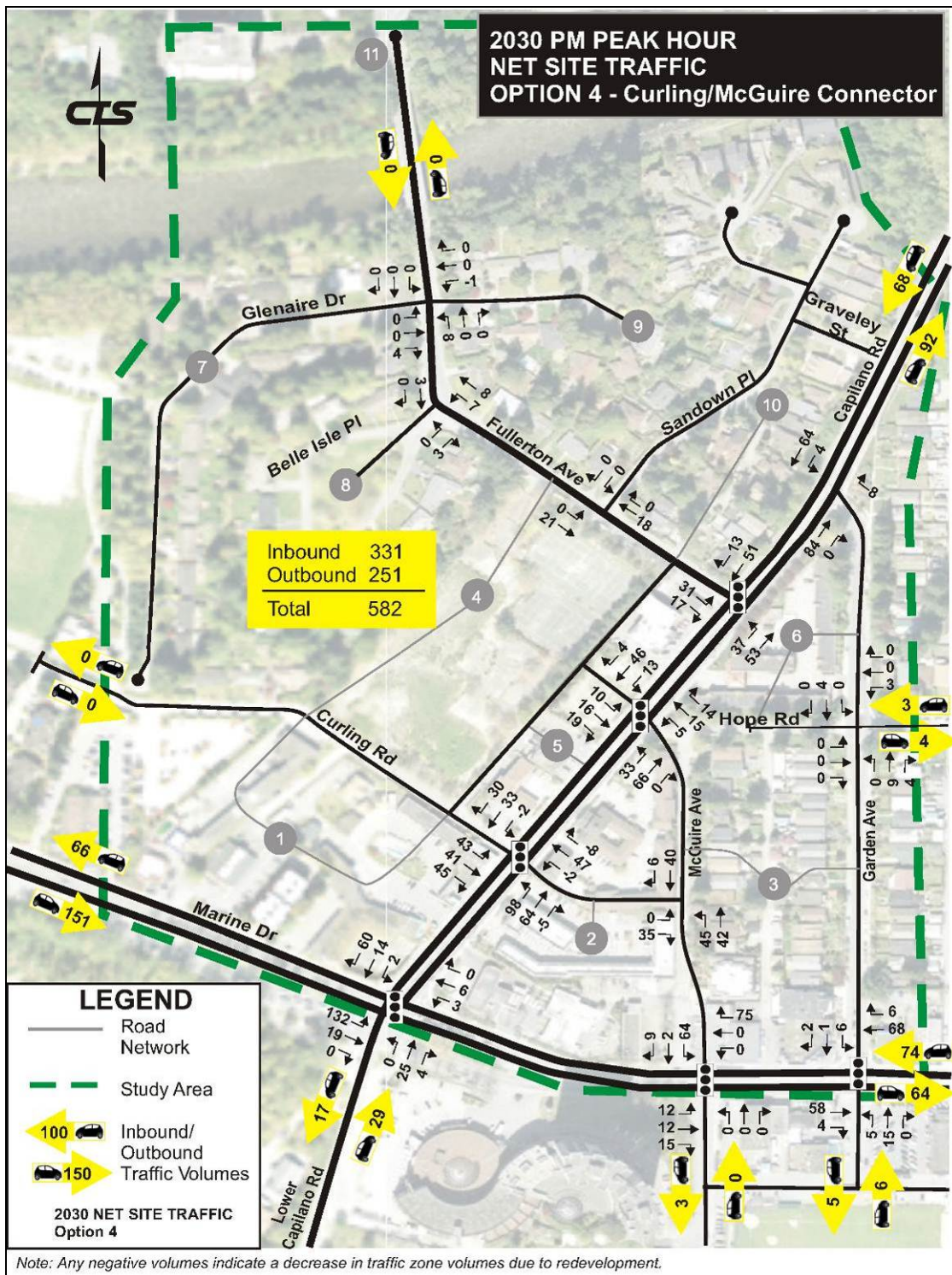
## 5.6 Option 4 – Curling/McGuire Connector

Option 4 involves the signalization of the intersection of Capilano Road & Curling Avenue and extending Curling Avenue eastwards to McGuire Avenue. Key network changes to this concept are as follows:

1. The intersection of Capilano Road & Curling Avenue is signalized;
2. Curling Avenue is extended eastwards from Capilano Road to McGuire Avenue;
3. The intersection of McGuire Avenue & Marine is signalized;
4. The intersection of Capilano Road & McGuire Ave is signalized;
5. A new north-south local road is constructed between Fullerton Avenue and Curling Avenue west of Capilano Road providing access to the redeveloped parcels; and
6. Buses on Capilano Road will be directed to McGuire Avenue to bypass the intersection of Capilano Road & Marine Drive.

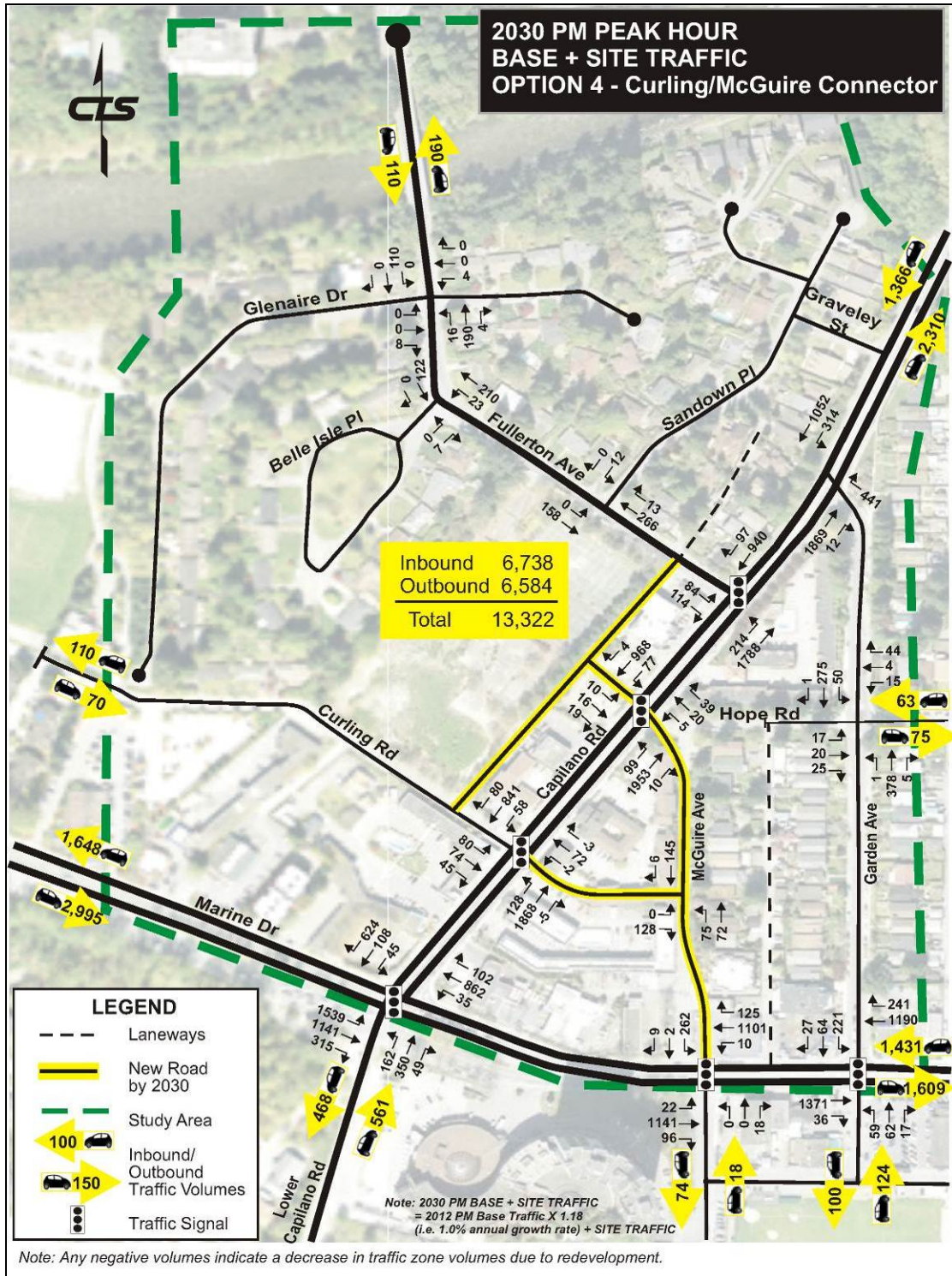
**FIGURE 5.13** illustrates the site generated traffic volumes during the weekday afternoon peak hour. **FIGURE 5.14** illustrates the 2030 base + site traffic volumes which is the result of superimposing **FIGURE 5.13** onto **FIGURE 3.1** with the reassigned traffic. **FIGURE 5.15** illustrates the laning configuration for the Option 4 scenario.

**FIGURE 5.13**  
**NET SITE GENERATED TRAFFIC VOLUMES – OPTION 4**





**FIGURE 5.14**  
**2030 BASE + SITE TRAFFIC VOLUMES – OPTION 4**





**FIGURE 5.15  
ASSUMED LANING CONFIGURATION - OPTION 4**





SECTION  
6

## TRAFFIC ANALYSIS

### 6.1 Intersection Capacity Analysis

Capacity analysis was performed at the 5 unsignalized and 3 signalized intersections for which there was traffic volume data available for the year 2012 in order to document the Level of Service (LOS) baseline conditions. LOS for intersections is defined in terms of delay (seconds per vehicle), which is a measure of driver discomfort and frustration, fuel consumption and lost travel time. An intersection or movement LOS can range from "A" (which is excellent) to "E" (which is capacity). A LOS of "F" indicates that an intersection or movement capacity is failing because vehicle delays are excessive. A LOS of "D" during the critical peak hours is considered acceptable by many public agencies in large urban areas for overall intersection operation and a LOS of "E" or better is considered acceptable for left turn movements at signalized intersections.

For signalized intersections, the Volume to capacity (v/c) ratios typically range from 0.25 to 1.20 with a v/c ratio of 1.0 indicating the movement, approach or intersection is at capacity.

HCS2010 was used for the unsignalized intersection analysis while Synchro (Version 8) was used for signalized intersection capacity analysis. The following assumptions were made with respect to the intersection capacity analysis:

- Saturation flow rate = 1,900 passenger cars/hour of green time/lane (pcphgpl)
- Truck percentage = 2%
- Peak Hour Factor (PHF) = 0.95 were used for the analysis as the traffic "peaking" characteristics varied throughout the study area.

**TABLE 6.1** summarizes the results of the unsignalized intersections capacity analysis and **TABLE 6.2** summarizes the results of the intersection capacity for the signalized intersections for both existing and 2030 scenarios. Worksheets can be found in **Volume 2 – Technical Appendices**.

**TABLE 6.1  
SUMMARY OF INTERSECTION CAPACITY ANALYSIS FOR UNSIGNALIZED INTERSECTIONS  
WEEKDAY AFTERNOON PEAK HOUR**

INTERSECTION	TIME OF DAY	SCENARIO	PERFORMANCE MEASURE	EASTBOUND			WESTBOUND			SOUTHBOUND			NORTHBOUND			LOS	NOTES		
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right				
Fullerton Ave (NB/SB) and Glenaire Dr (EB/WB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	0	0	4	5	0	0	0	110	0	8	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	10.9	10.9	10.9	7.6	7.6	7.6	7.5	7.5	7.5				
		2030 Base (Do Nothing)	Volumes	0	0	4	5	0	0	0	110	0	8	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	10.9	10.9	10.9	7.6	7.6	7.6	7.5	7.5	7.5				
		2030 Base + Site (Do Nothing)	Volumes	0	0	8	4	0	0	0	110	0	16	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	11.1	11.1	11.1	7.6	7.6	7.6	7.5	7.5	7.5				
		2030 Base + Site (Option 1)	Volumes	0	0	8	4	0	0	0	110	0	16	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	11.1	11.1	11.1	7.6	7.6	7.6	7.5	7.5	7.5				
		2030 Base + Site (Option 2)	Volumes	0	0	8	4	0	0	0	110	0	16	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	11.1	11.1	11.1	7.6	7.6	7.6	7.5	7.5	7.5				
		2030 Base + Site (Option 3)	Volumes	0	0	8	4	0	0	0	110	0	16	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	11.1	11.1	11.1	7.6	7.6	7.6	7.5	7.5	7.5				
		2030 Base + Site (Option 4)	Volumes	0	0	8	4	0	0	0	110	0	16	190	4	A	Okay.		
			Delay	8.9	8.9	8.9	11.1	11.1	11.1	7.6	7.6	7.6	7.5	7.5	7.5				
Fullerton Ave (NB/SB) and Belle Isle Pl (WB/EB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	0		4					119	0	16	202		A	Okay.		
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
		2030 Base (Do Nothing)	Volumes	0		4						119	0	16	202		A	Okay.	
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
		2030 Base + Site (Do Nothing)	Volumes	0		7						122	0	23	210		A	Okay.	
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
		2030 Base + Site (Option 1)	Volumes	0		7						122	0	23	210		A	Okay.	
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
		2030 Base + Site (Option 2)	Volumes	0		7						122	0	23	210		A	Okay.	
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
		2030 Base + Site (Option 3)	Volumes	0		7						122	0	23	210		A	Okay.	
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
		2030 Base + Site (Option 4)	Volumes	0		7						122	0	23	210		A	Okay.	
			Delay	8.9		8.9						0.0	0.0	7.5	7.5				
Sandown Pl (NB/SB) and Fullerton Ave (WB/EB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	0	137			248	13				12		0	A	Okay.		
			Delay	7.8	7.8			0.0	0.0				11.2		11.2				
		2030 Base (Do Nothing)	Volumes	0	137			248	13					12		0	A	Okay.	
			Delay	7.8	7.8			0.0	0.0				11.2		11.2				
		2030 Base + Site (Do Nothing)	Volumes	0	158			284	13					12		0	A	Okay.	
			Delay	7.9	7.9			0.0	0.0				11.7		11.7				
		2030 Base + Site (Option 1)	Volumes	0	158			284	13					12		0	A	Okay.	
			Delay	7.9	7.9			0.0	0.0				11.7		11.7				
		2030 Base + Site (Option 2)	Volumes	0	158			284	13					12		0	A	Okay.	
			Delay	7.9	7.9			0.0	0.0				11.7		11.7				
		2030 Base + Site (Option 3)	Volumes	0	158			284	13					12		0	A	Okay.	
			Delay	7.9	7.9			0.0	0.0				11.7		11.7				
		2030 Base + Site (Option 4)	Volumes	0	158			266	13					12		0	A	Okay.	
			Delay	7.9	7.9			0.0	0.0				11.7		11.7				
Capilano Rd (NB/SB) and Garden Ave (WB/EB)	Weekday Afternoon Peak Hour	2012 Base	Volumes						367	263	837			1513	10	B	Okay.		
			Delay							81.5	31.1	0.0			0.0			0.0	
		2030 Base (Do Nothing)	Volumes								433	310	988			1785	12	E	
			Delay								246.4	101.0	0.0			0.0	0.0		
		2030 Base + Site (Do Nothing)	Volumes								449	317	1049			1861	12	E	
			Delay								306.9	136.0	0.0			0.0	0.0		
		2030 Base + Site (Option 1)	Volumes								441	380	986			1869	12	F	
			Delay								300.2	229.4	0.0			0.0	0.0		
		2030 Base + Site (Option 2)	Volumes								449	317	1049			1861	12	E	
			Delay								306.9	136.0	0.0			0.0	0.0		
		2030 Base + Site (Option 3)	Volumes								441	314	1052			1869	12	E	
			Delay								300.2	137.0	0.0			0.0	0.0		
		2030 Base + Site (Option 4)	Volumes								441	317	1052			1869	12	E	
			Delay								300.2	137.0	0.0			0.0	0.0		
Capilano Rd (NB/SB) and Curling Rd (WB/EB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	37		33					736	50	60	1519		A	Okay.		
			Delay	21.4		21.4						0.0	0.0	9.9	0.0				
		2030 Base (Do Nothing)	Volumes	37		33						868	50	60	1792		A	Okay.	
			Delay	26.3		26.3						0.0	0.0	10.6	0.0				
		2030 Base + Site (Do Nothing)	Volumes	83		87						932	71	217	1894		B	Okay.	
			Delay	218.9		218.9						0.0	0.0	13.4	0.0				
		2030 Base + Site (Option 1)	Volumes			107						926	79		2110		A	Okay.	
			Delay			13.2						0.0	0.0		0.0				
Garden Ave (NB/SB) and Hope Rd (WB/EB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	14	17	21	10	3	37	42	230	1	1	313	1	B	Okay.		
			Delay	8.7	8.7	8.7	8.4	8.4	8.4	10.3	10.3	10.3	10.8	10.8	10.8				
		2030 Base (Do Nothing)	Volumes	17	20	25	12	4	44	50	271	1	1	369	1	B	Okay.		
			Delay	9.2	9.2	9.2	8.9	8.9	8.9	11.7	11.7	11.7	12.5	12.5	12.5				
		2030 Base + Site (Do Nothing)	Volumes	25	23	43	15	4	44	50	278	1	1	378	2	B	Okay.		
			Delay	9.6	9.6	9.6	9.2	9.2	9.2	12.3	12.3	12.3	13.4	13.4	13.4				
		2030 Base + Site (Option 1)	Volumes	17	23	29	12	7	44	50	279	63	19	378	2	B	Okay.		
			Delay	9.6	9.6	9.6	9.3	9.3	9.3	13.5	13.5	13.5	14.0	14.0	14.0				
		2030 Base + Site (Option 2)	Volumes	25	23	35	15	4	44	50	278	1	1	378	2	B	Okay.		
			Delay	9.8	9.8	9.8	9.4	9.4	9.4	13.6	13.6	13.6	13.7	13.7	13.7				
		2030 Base + Site (Option 3)	Volumes	17	23	30	15	4	44	50	275	1	1	378	2	B	Okay.		
			Delay	9.3	9.3	9.3	9.1	9.1	9.1	12.0	12.0	12.0	13.0	13.0	13.0				
		2030 Base + Site (Option 4)	Volumes	17	20	25	15	4	44	50	275	1	1	378	5	B	Okay.		
			Delay	9.3	9.3	9.3	9.1	9.1	9.1	11.9	11.9	11.9	12.9	12.9	12.9				

Delay = Average Delay (seconds/vehicle)  
  Intersection approaching capacity (LOS 'D' or 'E'); or medium approach delays (25sec to <50sec)  
  Intersection equals or exceeds capacity (LOS 'F'); or high approach delays (=> 50sec)

**TABLE 6.2  
SUMMARY OF INTERSECTION CAPACITY ANALYSIS FOR SIGNALIZED INTERSECTIONS  
WEEKDAY AFTERNOON PEAK HOUR**

INTERSECTION	TIME OF DAY	SCENARIO	PERFORMANCE MEASURE	EASTBOUND			WESTBOUND			SOUTHBOUND			NORTHBOUND			LOS	NOTES
				Left	Thru	Right	Left	Thru	Right	Left	Thru	Right	Left	Thru	Right		
Capilano Rd (NB/SB) and Fullerton Ave (EB/WB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	53		97					753	84	177	1470		B	
			V/C	0.21		0.32					0.44	0.44	0.42	0.77			
		2030 Base (Do Nothing)	Volumes	53		97					889	84	177	1735		B	
			V/C	0.21		0.32					0.51	0.51	0.48	0.90			
		2030 Base + Site (Do Nothing)	Volumes	93		114					937	97	196	1771		B	
			V/C	0.32		0.33					0.56	0.56	0.59	0.95			
		2030 Base + Site (Option 1)	Volumes	99		104					874	97	235	1773		B	
			V/C	0.33		0.29					0.51	0.51	0.63	0.92			
		2030 Base + Site (option 2)	Volumes	93		114					937	97	256	1771		B	
			V/C	0.32		0.32					0.54	0.54	0.72	0.92			
		2030 Base + Site (Option 3)	Volumes	93		114					940	97	256	1779		B	
			V/C	0.32		0.32					0.54	0.54	0.72	0.92			
		2030 Base + Site (Option 4)	Volumes	84		114					940	97	214	1788		B	
			V/C	0.29		0.32					0.54	0.54	0.60	0.93			
Capilano Rd (NB/SB) and Marine Dr (EB/WB)	Weekday Afternoon Peak Hour	2012 Base	Volumes	1201	942	267	36	725	129	115	80	478	137	275	38	F	
			V/C	3.59	0.98	0.48	0.30	0.53	0.11	0.64	0.32	0.47	0.41	0.03			
		2030 Base (Do Nothing)	Volumes	1417	1112	315	42	856	152	136	94	564	162	325	45	F	
			V/C	4.23	1.16	0.57	0.35	0.62	0.13	0.89	0.38	0.62	0.49	0.04			
		2030 Base + Site (Do Nothing)	Volumes	1568	1112	315	43	862	224	192	110	624	162	354	45	F	
			V/C	4.68	1.16	0.57	0.36	0.63	0.19	1.32	0.42	0.80	0.53	0.04			
		2030 Base + Site (Option 1)	Volumes	1550	1130	315	41	856	203	184	112	630	162	350	49	F	
			V/C	4.39	1.07	0.51	0.25	0.61	0.14	0.58	0.15	0.40	0.31	0.46	0.03		
		2030 Base + Site (option 2)	Volumes	1550	1130	315	45	868	224	186	108	618	162	350	49	F	
			V/C	4.39	1.07	0.51	0.28	0.61	0.16	0.59	0.14	0.39	0.31	0.46	0.03		
		2030 Base + Site (Option 3)	Volumes	1559	1121	315	43	862	102	76	110	624	162	354	45	F	
			V/C	0.41	1.06	0.51	0.26	0.61	0.07	0.24	0.14	0.39	0.31	0.47	0.03		
		2030 Base + Site (Option 4)	Volumes	1539	1141	315	45	862	102	45	108	624	162	350	49	F	
			V/C	4.35	1.08	0.51	0.28	0.61	0.07	0.14	0.14	0.39	0.31	0.46	0.03		
Garden Ave (NB/SB) and Marine Dr (EB/WB)	Weekday Afternoon Peak Hour	2012 Base	Volumes		1113	27	0	951	199	182	53	21	46	40	14	B	
			V/C		0.61	0.61	0.62	0.62	0.62	0.79	0.05	0.31	0.04				
		2030 Base (Do Nothing)	Volumes		1313	32	0	1122	235	215	63	25	54	47	17	C	
			V/C		0.78	0.78	0.79	0.79	0.79	0.82	0.06	0.34	0.04				
		2030 Base + Site (Do Nothing)	Volumes		1364	34	0	1186	245	228	66	35	59	48	17	C	
			V/C		0.83	0.83	0.85	0.85	0.85	0.85	0.08	0.37	0.04				
		2030 Base + Site (Option 1)	Volumes	22	1355	35	0	1169	262	237	65	24	58	49	17	B	
			V/C	0.16	0.69	0.69	0.50	0.50	0.50	0.79	0.05	0.32	0.04				
		2030 Base + Site (option 2)	Volumes	22	1358	34	0	1186	245	234	66	43	59	48	17	B	
			V/C	0.16	0.69	0.69	0.50	0.50	0.50	0.79	0.09	0.32	0.04				
		2030 Base + Site (Option 3)	Volumes	13	1220	32	0	1072	359	372	68	32	54	53	17	C	
			V/C	0.14	0.75	0.75	0.60	0.60	0.60	0.90	0.05	0.24	0.03				
		2030 Base + Site (Option 4)	Volumes	14	1371	36	0	1190	241	221	64	27	59	48	17	B	
			V/C	0.10	0.68	0.68	0.49	0.49	0.49	0.78	0.06	0.33	0.04				

V/C = Volume to Capacity Ratio

Intersection approaching capacity (LOS 'D' or 'E'); or approach demand near capacity (v/c 0.85 to 0.99)

Intersection equals or exceeds capacity (LOS 'F'); or approach demand exceeds capacity (v/c ≥ 1.00)



## 6.2 Review of Intersection Performance

From **TABLE 6.1** and **TABLE 6.2**, the following key observations can be made:

1. The intersections of Fullerton Avenue & Glenaire Drive, Fullerston Avenue & Belle Isle Place and that of Fullerton Avenue & Sandown Place all operate at LOS A (excellent) for all scenarios tested and no capacity or delay issues were noted.
2. The intersection of Capilano Road & Garden Avenue currently operates at LOS B (good) but is forecast to drop to LOS E (at capacity) by the year 2030 for all scenarios. Main reason is the increase in northbound traffic on Capilano Road which will reduce the available gaps for southbound left turn and westbound right turn movements from crossing or entering Capilano Road.
3. The intersection of Capilano Road & Curling Avenue will encounter significant delays to side street traffic by the year 2030 after redevelopment if Curling Avenue continues to remain stop controlled.
4. For the intersection of Capilano Road & Fullerton Avenue, the intersection operates at LOS B (fair) for all scenarios tested. However, the two northbound through lanes on Capilano are projected to be approaching capacity for all 2030 scenarios.
5. For the intersection of Capilano Road & Marine Drive, the intersection operates at LOS F (failing) for both existing and all future 2030 scenarios when only 1 lane southbound is available on the Lions Gate Bridge.
6. For the intersection of Garden Avenue & Marine Drive, the intersection currently operates at LOS B (good) for the year 2012. By the year 2030, the LOS is forecast to remain the same for Options 1, 2 and 4 and decrease to LOS C (fair) for the Do Nothing with and without site traffic, as well as Option 3.

### 6.3 Impact of New Signals in Study Area

Of critical importance when determining the viability of various transport plan options was the ability to coordinate the traffic signals when additional ones were being proposed in close proximity to each other. For this exercise, the Synchro model was refined and examined in more detail for each scenario. After a detailed assessment of various signal coordination options, it was determined that double cycling all signalized intersections in the study area with the exception of Capilano Road & Marine Drive would result in an operational signal coordination plan for Lower Capilano. The key elements of this plan for the weekday afternoon peak hour are as follows:

1. The intersection of Capilano Road & Marine Drive would operate with a 150 second cycle length; and
2. All other signalized intersections in the study area would operate at a 75 second cycle length.

In addition, a detailed review of the queue simulation using the Synchro model was done. This assessment determined that the extension of Curling Avenue east of Capilano Road would result in improved signal operations along Capilano Road as left turn traffic could be reassigned to side street through movements, thereby reducing the length of the left turn phases. In addition, this has the benefit of reducing the left turn storage length requirements along Capilano Road between Marine Drive and Curling Avenue.

Of note, for Option 3 with Curling Avenue were extended to Garden Avenue and the McGuire Avenue & Marine Drive intersection were not signalized, this would result in the need for dual southbound left turn lanes on Garden Avenue @ Marine Drive.

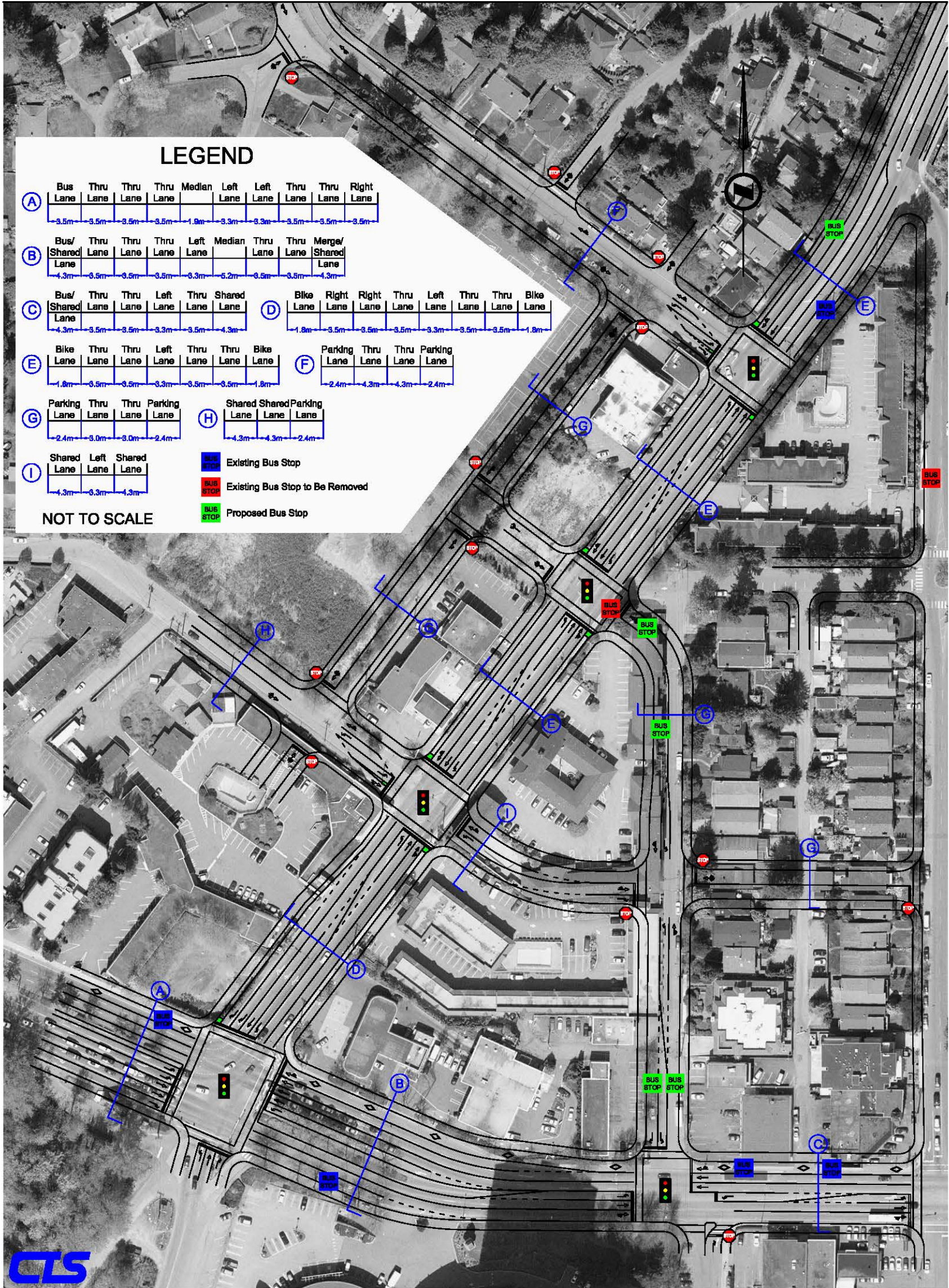
## 6.4 Recommended Transport Plan

After a detailed review of the year 2030 traffic volume projections for the “Do-Nothing” and 4 “Do-Something” options, as well as reviewing laning requirements, signal operations, left turn queuing and storage space needs, the recommended transport plan for Lower Capilano was developed and this is illustrated in **FIGURE 6.1**. The key elements of the recommended transport plan are as follows:

- 1) Extension of Curling Avenue east towards Garden Avenue to provide significantly improved access to the entire study area;
- 2) Signalization of the intersections of Capilano Road & McGuire Avenue, Capilano Road & Curling Avenue and that of McGuire Avenue & Marine Drive;
- 3) Construction of a new local road parallel to Capilano Road connecting Fullerton Avenue to the north with Curling Avenue to the south;
- 4) Reconstruction and widening of Fullerton Avenue between Capilano Road and the new north-south local road to provide for side by side left turn bays;
- 5) Reconstruction and widening of Curling Avenue between Capilano Road and the new north-south local road to provide for side by side left turn bays;
- 6) Reconstruction of Capilano Road between Fullerton Avenue and Curling Road to meet current municipal design standards for a 5 lane cross section but which involves no new lanes;
- 7) Addition of a new southbound left turn lane on Capilano Road at Marine Drive;
- 8) Construction of new on-street bikes lanes on Capilano Road between Fullerton Avenue and Marine Drive to complete the extension of the new bike lanes on Capilano Road;
- 9) Reconstruction and widening of McGuire Avenue to a 3 lane cross section so that bus service on Garden Avenue can be moved to McGuire Avenue;
- 10) Addition of five (5) new bus stops to the study area and the removal of two (2) existing bus stops;
- 11) A new bus route on McGuire Avenue to link Capilano Rd. and Marine Drive; and
- 12) The proposed transport plan is expandable should the need develop beyond the year 2030 to extend Curling Avenue east of Garden Avenue.



**FIGURE 6.1  
RECOMMENDED LANING CONFIGURATION FOR 2030 TRANSPORT PLAN**



**LOWER CAPILANO STREET NETWORK PLAN (2030)**



SECTION  
**7**

## CONCLUSIONS & RECOMMENDATIONS

### 7.1 Conclusions

- 1) Although Lower Capilano is bisected by two major roads and has a number of entry and exit points, there are a number of key geographical, jurisdictional and topographical challenges that make the development of a viable transport plan for both current and future conditions challenging. These challenges include the following:
  - Frequent recurring vehicle queue spillbacks from the Lions Gate Bridge that restrict traffic travelling southbound on Capilano Road and westbound on Marine Drive;
  - The limited number of bridges over the Capilano River to the west and north;
  - The limited number of road connections with the District of West Vancouver to the west and north;
  - Future public vehicle access to Marine Drive west of Capilano Road will be prohibited due to the bus lane and its proximity to the Lions Gate Bridge;
  - Regional traffic, which is estimated to be 94.5% of all traffic currently driving through Lower Capilano, is expected to continue to increase for the foreseeable future;
  - The use of the private automobile is the dominant mode of transport on the North Shore and is forecast to remain so for the foreseeable future;
  - Bus and bike facilities need to be significantly enhanced in order to reduce the reliance of North Shore residents on the private automobile and to ensure that alternative modes of transport become viable options; and
  - 85% of the new traffic estimated to be generated by the redevelopment would come from properties on the west side of Capilano Road triggering the need for significant improved vehicle accessibility.
  
- 2) Traffic counts to quantify base line conditions determined that during the weekday afternoon peak, the study area accommodated 10,875 vehicles trips of

- which 5,455 veh/hr were inbound and 5,420 veh/hr were outbound. The intersection that carried the most vehicles was Capilano Road & Marine Drive which carried close to 4,400 vehicles in one hour.
- 3) Baseline pedestrian counts measured a total of 203 pedestrian movements during the weekday afternoon peak hour of which 99 were inbound and 114 outbound. Similarly for bicycle counts, a total of 203 bicycle trips were recorded during the afternoon peak hour of which 106 were inbound and 97 were outbound.
  - 4) A comprehensive 6 hour transport mode survey of Lower Capilano from October 2011 determined that a total of 81,439 people were counted entering and/or exiting the Lower Capilano study area. The afternoon peak period was the dominant of the two 3 hour survey periods as 10,907 more people were observed than in the morning. The 6 hour total modal split showed that 77.9% of people in the Lower Capilano area used the automobile as their primary mode of transport, 19.6% used public transit, and the remaining 2.5% utilized motorcycles, bicycles or walked.
  - 5) The total volume of regional traffic entering and exiting Lower Capilano is projected to increase by 17% from 10,875 to 12,740 vehicles (or +1,865 cars) during the weekday afternoon peak hour between the year 2012 and 2030.
  - 6) As of 2012, the District of North Vancouver estimates that there were a total of 1446 dwelling units, 4,872 square metres of commercial retail space, 3,499 square metres of office space and 380 motel / hotel rooms in the Lower Capilano study area. It is estimated that Lower Capilano currently generates 1,028 vehicle trips (i.e. 552 vehicles inbound and 476 vehicles outbound) during the weekday afternoon peak hour.
  - 7) Approximately 5.5% of the total traffic entering and exiting Lower Capilano is considered local traffic with an origin or destination inside the community. The remaining 94.5% of the traffic is regional traffic that is “just passing through the community” and with limited opportunities for changing travel behavior in the short to medium term.
  - 8) For the Year 2030 and will full development of the Lower Capilano Marine Village Centre, a total of 2,960 dwelling units, 120 seniors housing units, 11,050 square



- metres of commercial retail space, 2,500 square metres of office space and 230 motel / hotel rooms are forecast by the District of North Vancouver. It is estimated that Lower Capilano will generate a total of 1,610 vehicle trips (i.e. 883 vehicles inbound and 727 vehicles outbound) during the year 2030 weekday afternoon peak hour after redevelopment.
- 9) However, because the existing land uses of Lower Capilano already generate significant traffic volumes, the redevelopment of these lands will result in a significant “traffic volume credit” which will reduce the net increase of new vehicle trips. For Lower Capilano, the “net” increase is forecast to be 582 additional vehicle trips (i.e. 331 vehicles inbound and 251 vehicles outbound) to the road network during the weekday afternoon peak hour, assuming no change in travel behavior. This increase in vehicle demand is equivalent to an additional 9.7 vehicle movements per minute, which given the size of the study area, is not considered significant. As well, this traffic is in addition to increase in regional traffic volumes on both Marine Drive and Capilano Road.
- 10) A review of the projected traffic volumes for the year 2030 by traffic zone determined the following:
- 3 of the key land uses (i.e. single family, office and accommodations) will see a decrease in traffic volumes due to the reduction in land use scope;
  - 1 of the traffic zones (No. 2) will see a net decrease in traffic volumes due to the land use changing to a less traffic intensive nature; and
  - Traffic zones 1, 4 and 5 will generate 85% of the new traffic estimated for the study area, all of which are located on the west side of Capilano Road. This in turn will put significant pressure on developing a good access management plan so that vehicles can enter and exit Capilano Road safely and efficiently.
- 11) The CTS project team in consultation with municipal staff developed the following five (5) network options to test against the proposed redevelopment plans for Lower Capilano for the year 2030:
- Do Nothing
  - Do Something: Option 1 – Crossroads

- Do Something: Option 2 – Signalize Intersection of Capilano Rd. & Curling Rd
  - Do Something: Option 3 – Curling Road Extension to Garden Ave
  - Do Something: Option 4: Curling / McGuire Connector
- 12) Intersection capacity analysis of critical intersections for both the year 2012 and future year 2030 options determined the following with respect to intersection performance and the Level of Service (LOS), which ranges from LOS A (excellent) to LOS F (failing):
- The intersections of Fullerton Avenue & Glenaire Drive, Fullerston Avenue & Belle Isle Place and that of Fullerton Avenue & Sandown Place all operate at LOS A (excellent) for all scenarios tested and no capacity or delay issues were noted.
  - The intersection of Capilano Road & Garden Avenue currently operates at LOS B (good) but is forecast to drop to LOS E (at capacity) by the year 2030 for all scenarios because of the increase in northbound traffic on Capilano Road reduce the available gaps in traffic.
  - The intersection of Capilano Road & Curling Avenue will encounter significant delays to side street traffic by the year 2030 after redevelopment if Curling Avenue continues to remain stop controlled.
  - For the intersection of Capilano Road & Fullerton Avenue, the intersection operates at LOS B (fair) for all scenarios tested. However, the two northbound through lanes on Capilano are projected to be approaching capacity for all 2030 scenarios.
  - For the intersection of Capilano Road & Marine Drive, the intersection operates at LOS F (failing) for both existing and all future 2030 scenarios when only 1 lane southbound is available on the Lions Gate Bridge.
  - For the intersection of Garden Avenue & Marine Drive, the intersection currently operates at LOS B (good) for the year 2012. By the year 2030, the LOS is forecast to remain the same for Options 1, 2 and 4 and

decrease to LOS C (fair) for the Do Nothing with and without site traffic, as well as Option 3.

- 13) A detailed assessment of various signal coordination options determined that double cycling all signalized intersections in the study area with the exception of Capilano Road & Marine Drive would result in an operational signal coordination plan for Lower Capilano. The key elements of this plan for the weekday afternoon peak hour are as follows:
  - The intersection of Capilano Road & Marine Drive would operate with a 150 second cycle length; and
  - All other signalized intersections in the study area would operate at a 75 second cycle length.
- 14) A detailed review of the queue simulation using the Synchro model determined that the extension of Curling Avenue east of Capilano Road would result in improved signal operations along Capilano Road as left turn traffic could be reassigned to side street through movements, thereby reducing the length of the left turn phases. In addition, this has the benefit of reducing the left turn storage length requirements along Capilano Road between Marine Drive and Curling Avenue.
- 15) If Curling Avenue were extended to Garden Avenue and the McGuire Avenue & Marine Drive intersection were not signalized (i.e. Option 3), this would result in the need for dual southbound left turn lanes on Garden Avenue @ Marine Drive.
- 16) A detailed review of the roadway requirements, the laning, signal operations, left turn queuing and left turn storage space requirements determined that the most viable transport plan to support the proposed Capilano Marine Village Centre is a combination of Option 3 – Curling Extension to Garden Avenue and Option 4 – Curling / McGuire Connector.
- 17) The key elements of the recommended transport plan are as follows:
  - Extension of Curling Avenue east towards Garden Avenue to provide significantly improved access to the entire study area;



- Signalization of the intersections of Capilano Road & McGuire Avenue, Capilano Road & Curling Avenue and that of McGuire Avenue & Marine Drive;
- Construction of a new local road parallel to Capilano Road connecting Fullerton Avenue to the north with Curling Avenue to the south;
- Reconstruction and widening of Fullerton Avenue between Capilano Road and the new north-south local road to provide for side by side left turn bays;
- Reconstruction and widening of Curling Avenue between Capilano Road and the new north-south local road to provide for side by side left turn bays;
- Reconstruction of Capilano Road between Fullerton Avenue and Curling Road to meet current municipal design standards for a 5 lane cross section but which involves no new lanes;
- Additional of a new southbound left turn lane on Capilano Road at Marine Drive;
- Construction of new on-street bikes lanes on Capilano Road between Fullerton Avenue and Marine Drive to complete the extension of the new bike lanes on Capilano Road;
- Reconstruction and widening of McGuire Avenue to a 3 lane cross section so that bus service on Garden Avenue can be moved to McGuire Avenue;
- Addition of five (5) new bus stops to the study area and the removal of two (2) existing bus stops;
- A new bus route on McGuire Avenue to link between Capilano Road and Marine Drive; and
- The proposed transport plan is expandable should the need develop beyond the year 2030 to extend Curling Avenue east of Garden Avenue.

## 7.2 Recommendations

- 1) That the recommended transport plan be presented to the public and stakeholders for review and comments; and
- 2) That preliminary design of the transport plan commence once the concept has been accepted.